A Cross in this space is a reminder that your Subscription to the Journal expires with this number.

ANNUAL RATES OF SUBSCRIPTION.
Farmers, Graziers, Horticulturists, and Schools of Art FREE on prepayment of 1/- to cover postage. Members of Agricultural Societies, 5/-, including postage. General Public, 10/- including postage.

QUEENSLAND AGRICULTURAL JOURNAL

VOL. XXVII. 1 APRIL, 1927. PART 4.

Event and Comment.

Dry Season Insurance.

That the matter of a national drought insurance scheme for the elimination of the drought menace had occupied the attention of the Queensland Government for some time past was stressed by the Acting Premier and Minister for Agriculture and Stock (Mr. W. Forgan Smith) in the course of a recent Press interview. The Minister himself has given the question comprehensive consideration, and discussed it on and off the platform, and he said that he appreciated the fact that if the recent discussion on the need for such a scheme conduced to the development of an enlightened public opinion on the matter, then it would have performed a very useful public service.

Mr. Forgan Smith went on to say that the difficulty had always been that though, in dry weather, the necessity for fodder and water conservation was fully realised by those concerned they were liable in bounteous seasons not to practically apply the lesson which they had previously learnt. It was within the bounds of possibility to provide for a proper system of dry season insurance, but it would require to be on a comprehensive scale. He had come to the conclusion that it would require to be compulsory, at least over a large area. Under the Agricultural Bank Act provision was made for special loan facilities for the erection of silos, for the improvement of water supplies, and for water conservation generally. It was a matter for regret that these facilities had not been taken advantage of to as large an extent as he would have liked.

He intended to have the question again listed for further consideration at the conference of Ministers for Agriculture and Directors of Agriculture which would be held in Adelaide this year.

A Wealth of Goodwill.

"The work of the Queensland Country Women's Association has a human touch about it, and a wealth of goodwill is manifested through its many activities," was the tribute paid by the Mayor of Brisbane (Alderman W. A. Jolly), who presided at the fourth annual meeting of the metropolitan branch of the Country Women's Association recently. The metropolitan branch has a membership numbering 233, and among its sub-committees is one that concerns itself with aiding travellers. Another sub-committee visits the hospital for sick children, and a member supervises the despatch of letters from children in hospital to their mothers in the country. A weekly car ride is conducted for convalescents.

Accommodation for about 440 mothers and children has been found at the metropolitan seaside home at Sandgate, and the demand has been in excess of that available. It is hoped to enlarge the home in the near future.

The association exerts a beneficial influence in many other directions, and all its activities are governed by the principle of selfless service. In moving the adoption of the annual report Archbishop Duhig said he did not know of any organisation stronger than the Country Women's Association. It had members representing every section of the citizens, and had the sympathy of all creeds and citizens in every part of the State. That was a very big advantage. They had some associations that were just sectional, but the Country Women's Association had cast aside all class considerations and had broken down all barriers, hence its enterprise was meeting with wonderful success.

The Commonwealth and Agricultural Research.

A conference of representatives of State Departments of Agriculture, the Universities of each State, and other bodies interested in agriculture (convened by the Council for Scientific and Industrial Research) was held in Melbourne in the course of the month to discuss the participation of the Commonwealth in agricultural research, particularly into the production of new varieties of plants.

It was decided that although much valuable investigation had been made by State Departments, and many new varieties of wheat had been produced, the work should be encouraged and extended to include other farm crops and plant genetics. The investigation of the character of plants and of the genetic factors involved in disease resistance, it was decided, should be a subject of research by the Commonwealth Department. On the other hand, plant-breeding, the application of scientific principles to the improvement of existing varieties, should be investigated by existing organisations. A similar division should be made regarding animal genetics and animal breeding. The establishment of a research station in tropical agriculture was recommended.

Farmers' Parliaments—What is done in South Australia.

The farmers of South Australia have evolved a valuable scheme of educational conferences and local gatherings at which practical working plans and methods of immediate local or seasonal importance are discussed, points of view defined, opinions exchanged and, when they differ, earnestly debated in a friendly way. These assemblies are held under the auspices of the Agricultural Bureau, which is linked with the Department of Agriculture, and of which every little local centre has its branch.. In the course of a recent visit to the great Southern wheat State the editor of this Journal had an opportunity of observing the scheme at work, and no one could fail to be impressed by its practical value to working farmers. In addition to monthly branch meetings district conferences are held periodically. Every meeting is made interesting. Set papers on field and stock raising practice and systems of cultivation are read by farmers and are open to general discussion. The value of active association with the bureau is appreciated by country people generally, who maintain a lively interest in its activities. The agenda of a recent conference at Ceduna gives some idea of the scope and usefulness of its work. Papers were read by farmers, who had backed their theories successfully in actual practice, on conservation of water and fodder, stock breeding and raising, the importance of good breeding, and rust in wheat. A "free parliament" followed in which points in field practice, wants, and grievances were discussed unreservedly. At branch meetings the same order is observed, with the result that a bureau meeting is never dull, and never means an evening wasted in futilities.

Women's branches, which correspond largely with the Country Women's Association, have also been formed, at the meetings of which matters of domestic economy and hygiene are intelligently discussed and useful knowledge disseminated. The underlying principle of these women's auxiliaries is plain. On most of the South Australian farms the poultry-yard, the dairy, and the fruit and flower gardens are as much the care of the woman as of the man, and it is realised that to restrict the advantages of the bureau to one sex is to hamper unnecessarily the development of these industries. Help for the country woman, both in respect to the branches of agriculture in which she is particularly interested and to her domestic responsibilities, is the objective of the bureau, and the experience of many years suggests that the Women's Agricultural Bureau performs most valuable service in rural districts. The attendance and interest of young people are also strongly fostered, and they are encouraged to express their opinions freely. The result is that through practice at bureau meetings the farmer is never at a loss to express himself forcefully, fearlessly, clearly, and intelligently on matters affecting his own industry and the welfare of the State, when necessity calls or the occasion demands.

Mastitis—Another Indictment Against the Fly.

At a recent gathering of veterinarians in Wales a virulent type of mastitis was discussed. The type as known in British dairying districts, it was said, is quite a distinctive one, and frequently, on superficial examination, the subject cow's udder hardly seems serious enough to account for the fact that the animal is extremely ill. Little pain, as a rule, is evinced on the handling of the affected part; it is swollen, and somewhat "doughy" to the touch, pitting on pressure. The contents of the sinus are flaccid and soft, and when withdrawn, are most offensive. The condition is most noticeable, according to a writer in a recent issue of "The Veterinary Record," at a time of the year when conditions are most favourable for fly breeding. The disease frequently attains the magnitude of an epidemic, affecting not only active lactating cows but dry cows, and in practically all cases the toxæmia is profound and the prognosis, especially if more than one quarter be affected, grave. Infected animals are a serious source of danger, and infection in concentrated form can be carried direct from them to others by the same medium as was probably the carrier in the first instance. As a result of close observation the common fly is blamed as the carrying cause. Most of us have seen how flies swarm around the orifice of the teat for the drop of milk remaining in the saucer-like little depression at the end of the teat, and it is not hard to understand how infection by the disease-carrying fly may be developed *viâ* the duct upwards. The annointing of the end of each teat with some adhesive disinfectant, such as carbolised vaseline or carbolised zinc ointment, is advised as a precautionary measure. On many dairies in the Old Country each milker is supplied with a small tin of the ointment which he carries in his pocket and, on completion of milking, dabs a little on the end of each teat. This practice has produced gratifying results and has led, when properly carried out, to entire prevention of mastitis and similar ailments.

Stomatitis—Nose and Mouth Affection of Cattle.

Every day inquiries are coming to the Department from stockowners in different parts of the State, but mainly from Southern districts, concerning an affection of the nose and mouth of cattle. In many cases so severe is it that the animals suffering from it are unable to eat. It is marked by exudations of saliva from the mouth. In some dairying districts it has become almost an epidemic. The Chief Inspector of Stock (Major Cory) has supplied the following note on the ailment for the benefit of our readers:—

"'*Stomatitis*' (inflammation of the lining membrane of the mouth).—This affection is due to various causes, but is most commonly seen in this country after wet weather when grasses are abundant, and affected with fungi due to the excessive moisture. Unless affected animals are treated in the early stages serious consequences may follow.

"The treatment recommended is to give the cow ¾ to 1 lb. of Epsom salts, 1 tablespoonful of ground ginger in one quart of cold water. Then the mouth should be washed out several times daily with either of the following washes:—A home remedy is: 1 tablespoonful of salt, ½ pint vinegar, 1 quart water, well mixed together; but the following is preferable: ½ oz. chlorate of potash, 2 oz. glycerine, 1 pint water."

Bureau of Sugar Experiment Stations.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received the following report (23rd February, 1927) from the Entomologist at Meringa, Mr. E. Jarvis:—

A NEW INSECT PEST OF MAIZE.

An interesting occurrence of the little chrysomelid beetle *Rhyparida morosa* Jac. was brought under my notice on 1st January, when several tiny grubs found to be destroying young maize plants in the Atherton district were submitted to this Experiment Station for identification.

These specimens, which were subsequently reared at our laboratory to the pupal and beetle conditions, proved to be—as was anticipated—the larval stage of one of our well-known cane pests, a small black or bronzy-black beetle about a quarter of an inch long, and of shining, very convex form, which is often found eating shot-holes in cane-leaves, blady grass, &c. Of late years its grubs have proved injurious to young shoots of plant and ratoon cane; being responsible for the local occurrence of "dead-hearts," which, however, are generally distributed more or less erratically over small areas of cane land.

At Atherton, larvæ of this insect were discovered in the soil to the number of a dozen or more around and amongst the roots of maize seedlings about 9 in. high, eating into the basal portion of stems and gnawing the succulent young roots; such damage resembling in appearance that caused by them to tender shoots of cane.

The habits and metamorphosis of *Rhyparida morosa* were first studied by the writer during 1920 (see "Queensland Agricultural Journal," vol. xiii., p. 274). Since that date, however, this pest has attracted attention from canegrowers in certain localities of the Cairns district as being a stem-boring insect of minor importance.

Occasionally these beetles occur in very great numbers over restricted areas of uncultivated forest country, where they can be observed at times resting on the flower-spikes of such grasses as *Andropogon fasciculatum* ("Mackay's Pest"); on leaves of "blady grass"; or more rarely assembled gregariously around the ends of young twigs of species of *Ficus*.

When noticed in considerable numbers on headlands supporting blady grass, &c., collecting the beetles by shaking them by thousands into shallow pans containing a film of kerosene on water is sometimes advisable.

Destroying the Subterranean Grubs of *Rhyparida morosa*.

Upon the first indication of "dead hearts" the grub-infested soil should be treated with paradichlor or carbon bisulphide.

It is quite useless to apply the latter fumigant unless the ground to be treated be free from excess of moisture, since otherwise the fumes being unable to travel between the soil particles will assuredly fail to reach more than a very small percentage of the grubs present. From three to four fine days should be allowed to elapse after heavy rain before commencing to fumigate well-drained volcanic soils.

Combating Grubs of Greyback Cockchafer.

Early in March the grubs of our formidable cane-beetle *Lepidoderma albohirtum* will be found in the second and third instars or stages of development, being at this time of year capable of inflicting their maximum degree of injury to the main roots of cane stools nearing maturity. These grubs may at once be distinguished from each other by the size of the head, which in those of the second instar measures $\frac{1}{4}$ in. in width, while in third-stage grubs the width is $\frac{3}{8}$ths of an inch. Although the size and weight of the body may of course vary considerably during the periods occupied by these instars, the head measurement always remains the same. Growers should make a mental note of these head widths of first, second, and third stage grubs of the greyback cane-beetle—viz., $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{3}{8}$ of an in. respectively.

With regard to control of these grubs, fumigation of infested cane land has been proved to be the best remedy known at present. The most effective fumigants to use for such work have been found to be paradichlorobenzene and carbon bisulphide.

The latter should never be used during wet weather. Application is made with a "Danks Injector," an appliance specially designed for this work, of very similar construction to the well-known Pal Injector used by M. Gastine more than thirty years ago for fumigating vineyards in France and elsewhere to destroy the dreaded "Grape Louse" (*Phylloxera vastatrix* Planch.).

The dosage usually recommended for cane-grubs is about half an ounce of carbon bisulphide applied at intervals of from 12 to 15 in. apart on both sides of the cane rows, and about 3 in. from the centre of the stools.

If using paradichlorobenzene, however, application may be made at any time during fine weather, as this fumigant continues to act effectively during a period of six to eight weeks after injection into the soil; whereas the toxic influence of carbon bisulphide does not last more than about twenty-four hours.

In addition to affording such prolonged fumigation (well calculated to destroy 100 per cent. of the grubs), paradichlorobenzene is insoluble in water, so that should excessive wet chance to immediately follow its application the action of this fumigant is merely retarded for the time being, and again becomes operative directly the surplus moisture in the soil has drained away.

Paradichlorobenzene can be produced from Messrs. Buzacott and Company, Limited, Brisbane, and Australian Co-operative Fertilisers Company, Roma street, Brisbane, in tins holding 32 lb., at a cost of 1s. 1d. per lb., while carbon bisulphide is obtainable from Taylor and Ellott, Limited, of 154 Charlotte street, Brisbane, in metal drums containing about 60 lb.

Experiments against the Giant Termite Continued.

During a recent visit to the Burdekin district last December, a few thousand living specimens of the notorious "white ant" (*Mastotermes darwiniensis* Frogg.) were collected by Mr. J. H. Buzacott (Assistant to Entomologist), and brought back to our laboratory at Meringa to be used for experimental purposes.

These insects, which consisted almost entirely of workers, were placed in suitable cages, containing pieces of cane stick to provide food and moisture, and up to the present (11th February) have lived inside these canes for fifty days.

Details of the various poison-baits tested need not be given here, it being sufficient to state that the simplest, cheapest, and most effective was found to be sodium arsenite.

The following brief summary of experiments with this poison carried out by Mr. Buzacott will be of interest to canegrowers:—

> "19th January, 1927.—Six cages were half-filled with soil and twenty termites placed in each. Three of these cages were furnished with pieces of split cane, and served as controls. The other three had pieces of cane soaked in a saturated solution of sodium arsenite placed in them. On 20th January, the termites in the three treated cages were all dead, whereas those in the controls lived for some days."

This experiment was confirmed a few days later by using 140 termites confined in seven cages, when we found that sections of cane soaked in a 10 per cent. solution of sodium arsenite gave similar results to those mentioned above.

Effects of Calcium Cyanide upon the Eggs of Cane-beetle.

Laboratory experiments conducted during last January (1927) demonstrated the efficiency of calcium cyanide as a fumigant for destroying the eggs of *Lepidoderma albohirtum* Waterh.

Eggs of this cane-beetle were buried a few days after deposition in cages containing moist earth, which was then injected with ten-grain doses of the flaked form, placed about 2 in. above where the eggs were lying.

Twenty-four hours later they were removed and laid on damp soil in Petrie dishes, in order that subesquent developments might be easily noted. Those taken from control cages increased in size from day to day, remaining throughout the experiment of a creamy-white colour, and finally at the end of a fortnight producing grubs; while all the eggs that had been subjected to fumigation failed to develop, turned brown in a few days and became mouldy-looking, thus giving a mortality of 100 per cent. as a direct result of this treatment.

CANE PESTS AND DISEASES.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has made available the following report (24th February, 1927) of the Southern Assistant Entomologist, Mr. R. W. Mungomery:—

Identity of Cane-beetle (*Lepidiota trichosterna* Lea).

Considerable confusion has arisen concerning the identity of one of our Southern Scarabæid beetles whose larvæ have been found damaging sugar-cane, and, up to the present, it has been referred to under the name of *Lepidiota grata* Blkb. In Bulletin No. 16, page 55, *L. grata* is described as coming from Gin Gin, and mention is also made of specimens of cane-grubs having been received from that district which in general appearance resembled those of *L. rothei*: . . . "the anal path being bordered by a slightly convex row of 12-15 setæ on either side meeting across the path . . . In view of the close resemblance of adult grata to that of rothei, it would seem perfectly feasible to connect the grubs from Gin Gin with the former species." Thus these grubs have gone under the name of *L. grata*, and it is evident that those grubs which at that time were injuring cane, were identical with the ones now perpetrating the greater portion of the damage in Gin Gin.

However, I am indebted to Mr. E. Jarvis for bringing under my notice that *L. grata* was a misnomer for our Southern species, and it is probable that this beetle does not occur at all in the Bundaberg district. Mr. Jarvis forwarded specimens of *Lepidiota No. 215*, taken in the Gordonvale district, to the British Museum for identification, and he was advised that that species was *Lepidiota grata* Blkb., and he further adds, "Accepting the British Museum identification, therefore, it is evident that the grubs in your district (Bundaberg) thought to be those of grata are not that species at all, but the larvæ of an undetermined Melolonthid."

During the past year these grubs have been reared through to the beetle stage, and Mr. A. M. Lea, coleopterist of the South Australian Museum, has kindly identified specimens forwarded to him as *Lepidiota trichosterna* Lea, this beetle being originally described in the "Proceedings of the Linnean Society, New South Wales," 1924, page 309, the type specimen from Gin Gin.

Thus *Lepidiota trichosterna* Lea becomes one of our serious Southern cane pests, doing noticeable damage at South Kalkie, Burnett, and Elliott Heads, Avoca, Gin Gin, and at Goodwood, and the habits of the insect which have at various times been described in previously monthly reports by the writer, under the name of *L. grata*, should be taken as referring solely to the species *Lepidiota trichosterna*, and not to *Lepidiota No. 215*.

Effect of Weather Conditions on Cane-grubs.

Phenomenal rainfall during the months of December, 1926, and January, 1927, in which period from 45 to 50 in. of rain fell, has had a decided influence on the natural control of several of our soil-frequenting insects. In this manner, as a result of many canefields in parts of the district being partially flooded, grubs have in several cases died through drowning. The precipitation during these months has been particularly heavy and long continued, and in December the rainfall amounted to approximately 20 in. Therefore, when rain ultimately ceased towards the end of that month, the fields were in a thoroughly saturated condition, and this state of affairs was maintained until the 18th January, when heavy rains again commenced to fall and continued almost to the end of January.

The most important falls registered at the Southern Sugar Experiment Station were 3.26 in. on 18th January, 6.20 in. 19th, 4.75 in. 22nd, 4.20 in. 25th, 1.63 in. 28th, and 2.19 in. on 1st February. This had the effect of keeping certain low-lying fields in a water-logged condition for over a fortnight, while parts of other fields were completely submerged during the whole of this period. The result was that many grubs were later found in the soil either dead or in an apparently lifeless condition. Concerning these latter, several of them were placed in drier soil and a few subsequently recovered, and these probably were those that had been submerged for shorter periods, while the remainder that had been submerged for longer periods died through the harsh treatment that they had received at Nature's hand. This mortality was observed to have taken place with third-stage grubs of *P. furfuracea*, and no doubt other species of Scarabæid grubs common in the Bundaberg district suffered a similar fate, and it is most likely that first-stage grubs, which at that time would be just hatching out, would suffer an even greater mortality, and it will be interesting to note during 1927 and 1928 whether grub infestation has materially lessened.

It may not be generally known that the artificial flooding of areas under cultivation for the destruction of white grubs has been in practice in many parts of Hungary since 1888. There it is customary to flood the meadows for periods of about eight days, this being the time required to kill the larvæ of the common European cockchafer (*Melolontha vulgaris L.*).

Weather conditions such as we have lately experienced have been especially advantageous to the destruction of our cane grubs, for during these months of the year grubs are particularly active, and after the first rains would be located near the surface of the soil. Such volumes of water falling in a comparatively short space of time would inundate fields, and the friable nature of the soil would allow the water to permeate through its loose particles and overwhelm the grubs before they had the opportunity to retreat to more impervious strata. Again, respiratory processes would then be at a maximum during summer, so that it would not be long before grubs were rendered inert through asphyxia and eventually died. Such mortality would take place in low or badly-drained fields only, in contrast to hill sides, where the water would quickly run off and the grubs soon recover from their temporary lethargy, therefore, it is doubtful whether places like Childers, Gin Gin, &c., which are characterised by the hilly nature of the fields under cultivation, would enjoy the same benefits that have resulted here from these recent heavy rains.

The Director of the Bureau of Sugar Experiment Stations has received the following reports (22nd February, 1927) from the Assistant to Pathologist, Mr. E. J. F. Wood.

Mosaic Problem in the Nambour and Beenleigh Districts.

The true aspect of the Mosaic Disease problem in regard to sugar-cane is largely a matter of conjecture in Southern Queensland. When shown the symptoms of the disease most farmers remark, "Yes, but it doesn't seem to have any great effect on the cane, and I haven't got much of it." Therein lies the insidiousness of this disease, for the cane to all appearance is practically healthy except for the characteristic leaf blotches. The crinkled and cankered nature of the stems is not apparent till the cane is cut, and then it is commonly put down to dry weather, wet weather, a touch of frost, or other causes.

Experiments have been carried out to find out if the c.c.s. is lowered by the disease, but the difference would seem insignificant, and some observers have denied its existence. The effect is in the size of the stick, the number of canes per stool and the consequent tonnage per acre. One can see at a glance that this is almost impossible to estimate accurately unless one has a field of 100 per cent. infected and another of the same variety alongside 100 per cent. healthy.

Present Extent of the Disease.

Out of eighty-one farms visited at Beenleigh, twenty-six were found to have Mosaic more or less spread over the farm. Fields of Green Baruma (N.G. 48) were found from 60 per cent. to 100 per cent. infected. The effect on this cane was noticeable to the farmers at cutting time.

At Nambour, many of the farms I visited showed more or less Mosaic. Mosaic Disease has been present in the Nambour district for twenty years or more.

Resistance and Tolerance.

There is a great deal of difference in meaning between these two words, with regard to Mosaic Disease. Q. 813 is highly resistant, and one will only find odd stools infected with Mosaic, even with a susceptible variety growing alongside. But the infected stools hardly grow at all and are a total loss. N.G. 48, on the other hand, grows almost to its normal height, and at times higher than usual, but the cane is cankered and withered looking, and the sticks are thin. This variety is susceptible but tolerant.

Control.

The use of a resistant variety such as Q. 813 is the best means of control, and if this be followed by efficient roguing the disease can be eliminated. Roguing is useless with a susceptible variety, as the disease spreads too rapidly and the process is not economical. Seed selection, has, in previous reports of this Bureau, been stressed and cannot be too much insisted upon.

The Future of the Problem.

The possibilities with which one is confronted are not the brightest. That is unless the farmers realise that Mosaic is a *serious disease*, capable of paralysing the sugar industry. It has terrorised the farmers in Porto Rico, and is now paralysing the industry in Louisiana.

Mr. A. F. Bell tells us that in the latter country they grow cane and corn adjoining each other as a general practice. Brandes and others have conclusively shown that the disease is readily transmitted between the two, and Mr. A. F. Bell gives this custom as the reason for the magnitude of the trouble in Louisiana.

This is precisely the practice among the farmers of the Beenleigh and Nambour districts, and unless some precautions are taken there is no reason why we should not suffer as much as Porto Rico and Louisiana.

Control measures are ready to our hand, for we, unlike Louisiana, have resistant varieties. If farmers can be persuaded to grow these and to get rid of N.G. 48 and Shahjahanpur 10, and, if necessary, such moderately susceptible varieties as D. 1135 and M. 1900 Seedling (by moderately susceptible, I mean those which show 30 to 60 per cent. infection as a general rule, where the disease is prevalent), and to rogue these fields frequently, the disease need never worry us.

The farmers should be urged to cease the practice of growing cane and corn on the same farm, and to keep fields and headlands clean of those grasses which are susceptible to Mosaic, for the corn aphis will transmit the disease to cane and many other grasses, though corn is its favourite host.

The object of this report is to warn farmers that they cannot afford to trifle with this disease, as it spreads rapidly, and has been estimated to cause a 50 per cent. to 70 per cent. loss in fields with 100 per cent. of infection (I quote Mr. A. F. Bell), which would create a deplorable state of affairs.

NAMBOUR AND MARYBOROUGH.

28th February, 1927.

In the Nambour district, Gum remains the biggest problem against which both the farmers and the officers of this department have to strive. It is a pity that so many farmers persist in their preference for D. 1135 despite the known susceptibility of this variety to Gum Disease. The fact that a dry spell has somewhat alleviated the disease last year has made many farmers forget the ravages of the year before. Most farmers will admit that D. 1135 gives a lower c.c.s. than such canes as H.Q. 285 and Q. 813, and that as it ratoons it becomes thinner in the stick, though it stools out as much as ever. Q. 813 gives on the average the same tonnage per acre, with fewer sticks and is far more resistant to disease than D. 1135. Luckily, Fiji Disease has not been found at Nambour. The Department is fighting hard to keep this malady within the Maryborough and Beenleigh areas. If it chanced to be already in the Nambour area, or if canes were surreptitiously introduced from Maryborough, Beenleigh, or the Northern Rivers, and it sprang up, D. 1135 would be wiped out.

Mosaic also affects D. 1135, while Q. 813 resists this and the other diseases. In this latter cane the farmer has a splendid substitute for D. 1135, except on very sandy soil. Here H. 227 or Q. 1098 might well be tried.

No cane can be said to be immune to Fiji, Gum, or Mosaic (except Uba), but with Q. 813 the few odd stools that may become infected can be economically "rogued" and burnt.

The infection, in a badly-infested area, would be about .01 per cent. or less, while with D. 1135 Gum attacks 10 per cent. to 70 per cent., Fiji 10 per cent. to 60 per cent., Mosaic about 30 per cent. in a similar area. Such fields cannot be dealt with. Q. 812 A has been considered identical with Q. 813, but it seems that this remains to be proved. The disease resistance is similar, but the cane seems darker in the stalk and the farmers say that they get a higher density. This obtained in six farms which grow the variety, so that the difference seems real. Farmers intend planting both varieties on a large scale when their identity or otherwise may be proven.

H.Q. 285, known as Early Maturer, is moderately susceptible to Gum and is useless for standover crops. The Rind Fungus (Melanconium sacchari) causes trouble in this cane, but as it is considered as a secondary parasite is probably due to borer infection (Phragmatiphila truncata) or to drought checks. It is a soft, quick-growing cane with a good c.c.s. (15); but cannot be highly recommended.

Badila is too slow in growing in this area, which is unfortunate, although its resistance to disease is much less here than in North Queensland.

The need is arising more and more for efficiently controlled nursery plots in isolated areas, run in conjunction with disease resistance, trials on badly infected farms. This would give each district the benefit of a number of well tried varieties to choose from, and a series of manurial and soil trials could be run for the more successful varieties. Such plots could well be run by farmers and millers in conjunction under the auspices of this Bureau, and would amply repay both parties. Seed selection and roguing could then be efficiently carried out, and disease reduced to a minimum.

In the Maryborough district, a much graver aspect is presented. Fiji disease has actually been seen on twenty farms, and more may be within the infected area. Many farmers are of the opinion that since the disease has not yet caused heavy losses, it may be disregarded. Never was there a greater mistake. The disease seems to have been present for from six to ten years, and if we assume, as we may well do, that it arose in one or two farms, through infected cane brought from Beenleigh or the Northern Rivers, the fact that it has spread to twenty farms, in which it is in almost every field to the extent of 1 or 2 per cent., shows that it is insidiously spreading.

On one farm in this area, I noted a field of M. 1900 Seedling (about ⅛ of an acre) only about ten healthy stools. Some had not ratooned owing to Fiji Disease, and the rest were hopelessly infected. Unless steps are taken *by the farmers* this sort of thing will become general.

The measures recommended just now are—

(1) The planting of more resistant varieties—Q. 813 and H.Q. 285.

(2) Efficient removal (roguing) of any diseased stools found.

(3) Seed selection. No cane within quarter of a mile of infected areas should be used for seed.

A detailed survey of the infected area is being made and, when finished, the results will be published in conjunction with the information gleaned by Mr. Dormer and myself at Beenleigh.

Mosaic is too prevalent in the Pialba area, and in this connection I must reiterate some advice I am continually giving to the farmers. *Shahjahanpur 10 should be dug out immediately.* It is 100 per cent. infected with Mosaic and distributes it to other varieties. It is a pity to see splendid farms, such as those at Takura, The Mountain, and the Nikenbah-Kawungan area spoiled by an ever-threatening invasion of Mosaic. *Now is the time to strike* before things have gone too far. A field spoiled by the digging out of a few plants is far better than one showing 20 per cent. loss of crop by disease. The Mountain, Pialba, and Takura areas would do well to isolate themselves, stamp out Mosaic and arrange for facilities to interchange plants without drawing from outside. They have all the best varieties growing on rich and poor soils, so a change of variety and soil are easily obtainable. Green manures should be more used in these areas, and in this connection it is most economical to harvest one's own seed. Corn is not a good green manure—it transmits Mosaic. Trials of various plants would well repay the growers. Mauritius bean, cowpea, giant cowpea, Poonah cowpea, and rice bean are recommended for trial, if seed is obtainable.

Cockchafer beetles are causing damage at the Mountain, and wire worms in some farms around Maryborough.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS, Entomologist.

Prepare to Combat Army Caterpillars.

Larvæ of our various species of Army or Grass Worms may suddenly invade cane land this month in more or less formidable numbers, so it is well to be ready to meet any attack that may call for prompt repressive action. A Knapsack spray pump and a few pounds of lead arsenate paste can be obtained at moderate cost, and will not deteriorate through keeping.

When the army chances to assume vast dimensions, deep furrows should be ploughed in front of the line of march taken up by the advancing host of caterpillars. The side of each furrow farthest away from the army should be trimmed with a sharp spade to form a vertical or slightly overhanging face; and holes about 1 ft. square and from 2 to 3 ft. deep dug in the bottom of the trench from 15 to 20 ft. apart. When these holes become filled up with the bodies of caterpillars travelling up and down the furrows trying to escape, a little kerosene is poured

upon the struggling mass, which a few minutes later can be shovelled out of the holes to make room for more victims.

Ordinary outbreaks, however, can generally be effectively controlled by spraying the cane leaves with lead arsenate, in such manner as to form a poisoned strip or band of about three cane rows wide immediately in front of the line of advance taken up by the caterpillars. Use 2 lb. of lead arsenate in about 50 gallons of water; taking care to keep the mixture well agitated whilst spraying it over the leaves, in order to ensure and maintain uniform suspension of this arsenical in the water.

Another good remedy is to mix up a poison-bait consisting of 1 lb. of Paris green thoroughly incorporated with 20 lb. of bran, to which is then added 2 lb. of molasses dissolved in a sufficient quantity of water to reduce the bait to a thick crumbling mass.

Sprinkle this mixture in pieces about the size of a walnut among affected cane rows, or in a furrow ploughed just in advance of the approaching caterpillars. This latter remedy applies chiefly to larvæ of such grass worms as *Laphygma exempta*, the so called "Swarming Caterpillar," which traverse the ground between cane rows even during midday in hot sunny weather, going from plant to plant.

Such poison-baits are best applied towards sundown, as they will then keep moist for a longer period and serve to destroy larvæ of *Cirphis unipuncta* and *C. loreyi*, which feed mostly under cover of darkness.

Effect of Cyclone on Weevil Borer.

On land where the cane has been levelled during the recent cyclonic disturbance on those situations liable during normal seasons to borer-infestation, conditions very favourable to the increase of this beetle will have become established. Being naturally a lover of darkness, seclusion, and moist atmospheric surroundings, we may expect trouble on areas on which cane sticks have attained a fair length. Growers should inspect such cane at intervals, and if discovering evidence of this pest having commenced attack on the basal portions of sticks, communicate at once with the Entomologist at Meringa Experiment Station. Tachinid Fly parasites of the borer in question will be released by the Sugar Bureau free of cost on areas affected by this insect, on condition that the grower will agree to leave at least a quarter of an acre of borer-infested cane uncut for these parasites to breed in. This area should be allowed to remain for about three months, and must on no account be burnt.

Advice to Growers.

Farmers desiring additional information regarding the control of these cane-pests are invited to consult the Entomologist at Meringa Laboratory. Postal address —Meringa Private Bag, Cairns.

Concerted action taken at the right time will often go far towards diminishing injuries caused by our more serious cane pests, and whilst not unduly trespassing on the growers activities on the farm would tend to benefit him financially.

ENTOMOLOGIST'S HINTS FOR APRIL.

By EDMUND JARVIS, Entomologist.

Fungus Attacking Cane-grubs.

During this month growers will most likely notice cane-grubs killed by the so-called "Green Muscardine" fungus (*Metarrhizium anisoplinæ*), which is often in evidence from March to May, or even in June. When attacked by this vegetable parasite, the body of the grub, instead of decomposing, retains its original shape, and gradually hardening turns at first white and then an olive green colour, the latter condition being the fruiting stage of this fungus consisting of a thin crust formed of chains of spores.

At this stage, being filled with the fungus roots or mycelium, these grubs become mummified, and can be broken into pieces just like dry, mouldy cheese.

The sphere of usefulness of this parasite can be much extended by collecting all such green crusted-looking grubs, breaking them into small pieces, and thoroughly mixing this with about 100 times the quantity of moist, finely-sifted soil, rich in organic matter.

This spore-laden earth should then be sprinkled or sown as thinly as possible in the furrows, when planting any areas of cane land thought likely to become grub-infested.

Bacterial Disease of Grubs.

Be on the watch for dead or dying grubs exhibiting black blotches on the sides or legs. These will probably be affected by bacterial diseases, but unlike those attacked by Green Muscardine fungus, instead of hardening internally remain quite flaccid and soon decompose to a black putrescent mass. Growers discovering evidence of such disease are urged to communicate with the Entomologist at Meringa Laboratory.

How to Combat Weevil-borers.

Watch the growth of cane on river flats or low-lying situations, and if discovering evidence of this pest having commenced to tunnel in the basal portions of cane sticks, make the matter known to the entomologist without delay.

Apply to the Bureau of Sugar Experiment Stations for tachinid fly parasites, which will be released free of cost on areas affected by this formidable insect, on condition that the farmer will agree to leave at least one-quarter of an acre of borer-infested cane uncut for these parasites to breed in. This area should be left standing for fully three months, and must on no account be burnt.

Collecting Cane-grubs.

During ploughing operations collect your grubs when plentiful. Those of the greyback cockchafer will be mostly in the second and third stages (width of head ⅜ of an inch); while grubs of *Lepidiota frenchi*, our smaller reddish-brown cane-beetles that was seen flying in great numbers last December are mostly in the second instar. All specimens noticed, however, should be picked up, as grubs of the latter insect will damage cane during September to December next, after moulting into the third stage.

It is well to remember that this common-sense method of control is recognised as being beneficial, and practised as a matter of course in other sugar-growing countries.

The value of dried grubs as a fertiliser is about £11 per ton, which is higher than that quoted for European cockchafers.

Such manure contains 10.20 per cent. nitrogen, 1.66 phosphoric acid, 1.73 potash, 0.27 lime, 63.75 proteins, and 4.82 fat.

There is a market in Sydney for dried grubs, which on account of this high percentage of proteins are a valuable food for poultry.

SOUTHERN CANE CROP PROSPECTS.

21st February, 1927.

The Director of Sugar Experiment Stations, who returned to Brisbane recently after a short visit to the Childers, Bundaberg, and Mackay cane districts, states that the trip to Mackay was made in the daylight in order to ascertain the appearance of the country. It may be said that from Brisbane to Mackay the country on each side of the railroad presents a most beautiful appearance, rich, tall grass is to be seen everywhere; all the waterholes are well filled and every creek now running. The difference when contrasted with that of a little over two months ago is amazing. At that time scarcely a blade of grass was to be seen around Rockhampton.

At Childers, a splendid recovery has been made from possibly the worst drought on record. The cane is making tremendous strides, and it is anticipated that excellent crops will be available for the two local mills. One drawback in this district was that a large amount of land was lying ready for planting when the great downpour in January fell. This caused considerable washaways of the red soil on hillsides. However, most of this is being remedied and planting is now proceeding. On the farm of Mr. A. Adie at North Isis, 12 acres of cane per day are being planted with a double machine planter drawn by a tractor. This machinery takes three men to supervise.

At Bundaberg everything is looking particlarly well, the cane is well forward and growing vigorously. Big crops are expected. Tremendous rains were experienced in this centre; in parts of the district as much as 50 inches had fallen in six weeks.

At Mackay, the cane was also well forward, although this district has not had as much rain as has fallen either to the north or to the south. Still, there has been sufficient to be of very great advantage to the cane without the drawback of strong blows or floods. At the present time it is expected that the crop will be an exceedingly good one.

CANE-BEETLES IN THE ISIS DISTRICT.

The Director of Sugar Experiment Stations has received the following report (23rd February, 1927) from the Southern Assistant Entomologist, on recent investigations in connection with cane-beetles in the Isis district:—

Throughout the many years during which experiments in control have been conducted against "white grubs," it has been widely recognised amongst leading economic entomologists, that the hand-collecting of beetles, though primitive, was a measure that was not to be looked on lightly or totally disregarded. In some countries it has been demonstrated that highly beneficial results have followed on such a procedure, and a marked diminution in the pest taken place, whereas previous to the imposition of such preventive measures, the pest was increasing in alarming proportions. In fact, some foreign publications from other sugar producing countries, which from time to time reach us, tell us that the collection of Scarabaeid beetles closely related to our cane-beetles, has proved to be the only adequate control so far evolved in preventing destruction of cane crops by "white grubs." Moreover, the practice is certainly a very natural method and one which readily suggests itself, for by getting at the root of the evil and destroying the egg-laden female beetle, we thus destroy a proportional number of eggs and so prevent the appearance of grubs in cane lands during the following years.

With these facts in mind it is not difficult to understand how the collecting of cane-beetles has come into vogue in Queensland. In several of the Northern sugar centres, including Cairns, Innisfail, Ingham, Ayr, and Mackay, the "greyback" beetle (*L. albohirtum* Water.) has at various times been collected and sold at so much per lb., and this practice is still being continued in many places. In the Isis district, too, beetle collecting has long been the custom, but in this instance the beetle is of a different species, namely, *Pscudoholophylla furfuracea* Burm., being a species of a shining reddish-brown colour, about three-quarters on an in. long, and therefore much smaller than its northern cousin, and in order that my remarks may not be taken to cover too wide a sphere, I wish to make clear that subsequent remarks and findings, unless otherwise stated apply solely to the species *P. furfuracea.* For several years this beetle has held sway in the Isis cane fields and during drier seasons has been a serious limiting factor in cane production on certain properties. The Isis farmers, always a progressive body of men and thoroughly alive to the situation, decided to have the beetles collected and make payment for them. This, together with the payment for grubs, has been the chief form of control practised. At first, payment was made at the rate of 4d. per hundred, a levy for this being made on each ton of cane supplied to the mills, but of later years a special pest rate has been struck by the Isis Shire Council, and payment for beetles made at the rate of 1s. 6d. per quart. Furthermore, in some cases, the managements of certain plantations, in an endeavour to free their lands from pests, have subsidised this payment by a similar amount, for all beetles and grubs caught within their boundaries. Upwards of £100 is spent annually on beetles alone, and it goes to show the sincerity with which the problem was tackled, but it seems unfortunate that the hundreds of pounds, which have been spent in this connection, have been wasted, and the efforts of individual growers proved fruitless, for, in the light of recent investigations, it was seen that such a system of supposed control was entirely inadequate and gives ample justification for the need of present and future scientific research.

Whilst the "greyback" beetles (males and females in about equal proportions) fly to, and feed on the foliage of various trees, chief of which are the figs and Moreton Bay Ash, from which they can be easily collected during the night or early morning, the "furfuracea" beetle has entirely different habits, remaining out of the ground only for a comparatively short time and not being attracted to trees for the purpose of feeding. On the other hand, it is extremely susceptible to the influence of artificial light, and during the flighting season advantage is taken of this peculiarity, and immediately after dusk, from about 7.30 p.m. until 8.30 p.m., beetles are attracted in thousands to light traps. Childers at that time of the year resembles a miniature Chinatown with its array of lanterns, slush lamps, &c., which are usually operated by children. These lights are dotted about in the fields or suspended over tubs of water, into which the beetles fly, and from which they are gathered at intervals.

In a further report ("Queensland Agricultural Journal," March, 1926, p. 206) the writer in a preliminary survey of the Southern cane districts for insect pests commended the action of the Childers growers thus: "It is gratifying to know that growers are fully awake to the seriousness of the depredations of this formidable pest, and through the pest fund of the Isis Shire Council payment at the rate of 1s. and 1s. 6d. per quart for grubs and beetles respectively is being made." Such

commendation was made on the assumption that equal proportions of male and female beetles were being captured, and evidently this assumption has been made and accepted by all parties concerned, and has now been proved to be incorrect. Later in the year at the Bundaberg Laboratory, whilst working on the differences in the sexual characters of the male and female beetles from those samples which had been collected at light traps, it occurred to the writer that there was an unduly high proportion of male beetles present, which prompted the theory that the male beetles were extremely susceptible to the influence of artificial light and were attracted thereto, whilst the females were little nor not at all attracted.

Opportunity was afforded during the recent flight in December to further the investigations in this direction, and the theory proved correct and was substantiated under all conditions. Samples of beetles, representative of those brought in to the honorary receivers, were taken in various parts of the district, from the beginning to the latter end of the emergence and the unquestionable preponderance of male over female beetles was fully demonstrated. For the total countings the actual figures were 51 female beetles and 8,380 males, which gives a proportion of less than 1 per cent. females taken, and the control being gained thereby is almost negligible. Thus this system is quite unprofitable, and without, for the present, being able to offer any suggestions for attracting the female beetle, I have no alternative but to recommend the discontinuance of the system of collecting the beetles of the species *P. furfuracea* Burm., and would further recommend that such money, which ordinarily would be spent in the payment for beetles be directed to a fund used for subsidising growers (say on a 50-50 basis) for the purchase of any fumigant such as carbon bisulphide, paradichlor, &c., used by them in the destruction of cane grubs, or other pests, and such fumigant to be approved by the Bureau of Sugar Experiment Stations.

FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports (*26th February*, 1927) :—

BUNDABERG.

On account of the low tonnages of cane per acre being produced in these areas of late years it is advisable to put on record the possible causes of low yields. Poor crops have caused much discussion. Some opinions are founded on ideas and statements which are not borne out by facts. As the result of careful study, inquiry, and a careful analysis of the situation, the writer is of the opinion that the important causes are weather conditions, unsatisfactory cultivation, drainage conditions, lack of local experiment to determine the value of fertilisers, grub and borer infestation, and diseases. While these factors will be discussed briefly separately, it should be kept in mind that the actual crop condition developed as a result of the combination rather than of any single one.

Weather Conditions.—It cannot be truly said there has been a good, well-distributed rainfall since 1917. Falls throughout the several seasons have been desultory and badly timed. Very often planting has been seriously interfered with by surplus moisture, and then the young plant crop checked by an abnormally long interval between the next watering. Too often frost has affected the retarded crop. Even if no other factor whatsoever existed, the farmers could not raise satisfactory crops under such conditions.

Cultivation, Drainage, and Fertilisation.—Under the heading of cultivation could be placed the important matter of fallowing. Lack of this rather than insufficient tillage is having a big effect on productivity. Drainage is necessary on every farm, preferably below the surface, as the soil is given great moisture-preserving properties and a better physical condition generally. Regarding fertilisation, it is improbable that any but a very small percentage of growers have carried out any local experiment in the course of the last ten years. In soils other than typical to those on the Bundaberg Sugar Experiment Station the farmers leave a lot to chance in the application of fertiliser.

Grub and Borer Infestation.—Losses have been caused by these pests, but they in no way seriously account for low tonnages per acre, although there are instances of individual farmers losing heavily.

Diseases.—Various diseases have, for a considerable time, had an influence on sugar production in Southern Queensland, the principal ones being Fiji Disease, Mosaic, Gumming, and Root Rot.

A malady that is causing much financial loss is Foot Rot Disease, a fungus parasite of the Marasmius species. It occurs in practically every cane country, and

in many it is the most serious of the cane diseases. Java, the West Indies, Hawaii, and Louisiana have all had Root Rot trouble.

The effect of Root Rot is more striking in a dry year than in a wet one, due to the fact that a plant with even a poor root system can absorb enough moisture from a wet soil to continue growth, but it is unable to do so in a dry soil.

Characteristics of Root Rot vary to a considerable extent. In general, the affected plants grow slowly, often have a yellow colour, and stool poorly in the early part of the season, though in the latter part of the season they may sucker considerably. Usually the lower sheaths of the affected stalks are connected by a white mould or mycelium, though not always.

It is not possible to say what percentage of loss has been caused by weather conditions, soil inferiority, or disease. It is evident, looking at the matter broadly, that the general crop condition is due to the whole complex.

The following are details of work carried out during the month:—

Bundaberg Sub-areas—Oakwood, Maidavale, and Rubyana.

Heavy rains caused a considerable amount of washing on these farms. The cane has responded well since Christmas. A cane grub (*L. frenchi*) is doing a limited amount of damage at Oakwood. Varieties growing well on these areas are H.Q. 285, Q. 813, E.K. 28, and M. 1900. The farmers are advised to try more E.K. 28 than they are at present doing.

Bucca.

The cane looked green and healthy and there should be a fair crop next year if reasonable rains occur. The roads have been extensively damaged by the rain, and some of the growers have suffered through soil losses.

Gin Gin.

This district is making a good recovery. The plant and ratoon cane is rapidly brightening. The countryside is in a thoroughly saturated condition, springs babbling everywhere. Cane varieties making a fine showing are M. 16804, Q. 813, M. 1900 Seedling, N.G. 24, H.Q. 285, and D. 1135. Highly satisfactory results are being obtained with green manures.

The Northern Field Assistant, Mr. A. P. Gibson, reports (22*nd March*, 1927):—

Innisfail.

Following is a table giving the areas harvested and tonnages of cane crushed by each of the four district mills during the 1926 crushing season:—

Mill.	Area Cut.	Tons Cane Crushed.	Week's Crushing.
	Acres.		
Mourilyan	7,624	135,473	25
Goondi	7,500	170,006	26
South Johnstone	9,575	165,442	30
Tully	5,800	148,006	28½
Total	30,499	618,927	..

NOTE.—The Tully mill crushed 16,291 tons from the South Johnstone mill area, and this amount is included in its total.

February was an anxious month, its outstanding weather feature being high winds accompanied by torrential rain. At the beginning it was exceptionally hot; spasmodic and heavy falls of rain were frequently experienced. These were sandwiched by brief intervals of brilliant sunshine. Such growing conditions forced the crop of cane and weeds along at an extraordinary pace. On the afternoon of the 8th February suspicious signs were noted, and the barograph commenced to fall rapidly, thus foretelling a fast approaching change. Local residents heeded the warning and prepared for the worst. The next forty-eight hours the area was severely swept by a high gale and torrential rain, the latter soon deeply inundating the low lands and converting peaceful running creeks and rivers into

raging torrents. The wind continued to increase in velocity until about 10 p.m. on the 9th, at which time the barograph had fallen to 29.28, after which it commenced to rise, when the wind gradually decreased in force.

The two months' rainfall record at South Johnstone Sugar Experiment Station, Innisfail, and Tully, is as follows:—

	Station.	Innisfail.	Tully.
	In.	In.	In.
January	21.02 ..	17.01 ..	34.58
February	41.11 ..	45.42 ..	65.65
	62.13 ..	62.43 ..	100.23

On February 10, 11, and 12 Tully registered 52.26 inches.

The Crop.

The 1926 season finished in good time, therefore it was thought that this would have been of great benefit to the subsequent crop, mainly because of the extended period of growth. Such expectations, however, were not fully realised owing to the somewhat scanty rainfall experienced during the latter half of the year. Splendid soaking rains have fallen since, and in consequence the crop, although dirty and neglected in parts, looked really well, and has been growing with amazing speed; so much so that it had every appearance of easily over-shadowing in tonnage the district's previous records. An early estimate of the crop likely to be harvested by the four district mills is given at some 760,000 tons; this, of course, was forecasted prior to the blow. Since the crop has been more or less roughly handled and may probably be reduced by some 60,000 tons. At present, however, it is impossible to estimate the losses likely to occur from the effects of wind and water other than very approximately. Again, March and April officially are the wettest months in these parts, and in consequence during this period this estimated present lost tonnage could easily be regained or increased.

After the Storm.

When the storm had passed away and the inundated lowlands became uncovered, it was found that the combined action of wind and water had occasioned severe destruction to property, roads, and crops. The crop damage roughly may be put down as follows:—By wind: Levelled cane crops, leaves generally tattered and torn, tops and stems more or less twisted, tangled or broken. By water: The finer soil had been washed off many farms, and silt upwards of three inches deposited on the flooded lowlands. Patches of cane twice deeply submerged had been killed or damaged, more so that covered by still water, because of the fact that this contained an enormous quantity of fine earth held in suspension and which when standing, was precipitated, much of the precipitate (mud) lodging in the heart or pores of the leaves, therefore having a smothering effect. Such damaged tops invariably occasion stem sprouting (mainly the top eyes) and this has a great tendency to considerably lower the crop's quality and quantity. Unforeseen losses are yet likely to occur, such as (1) possible c.c.s. reduction; (2) probable higher crop handling costs; (3) increased destruction by pests and fungi which is often brought about by the injured nature of canes. The good done by water perhaps is that it has prevented serious grub injury, also it has severely swept the jumping-off places of the destructive rat, therefore destroying many.

Cultivation.

Excessive and prolonged wetness in conjunction with tangled crops has practically precluded interspace cultivation. Although the crop for the greater part had reached the stage when this work is hardly necessary, nevertheless there is the likelihood of a rapid weed growth taking place in the more recumbent crops, which with possible cultivation could have been controlled. Again the thorough preparation of land for subsequent plantings is being delayed. Fortunately, there was fine weather at the very end of the month, when there was little rain, but much glorious sunshine; a few such days would soon permit the continuance of the most essential field work.

Varieties.

N.G. 15 (Badila)—the admitted all-round favourite variety grown in these parts—is the leader in most Northern fields. This popular variety had weathered the gale and torrential rain better than the small percentage of other varieties grown. The flattened canes speedily recovered, and within a day or two following the storm were upstanding, but that showing stem was bow-shaped and had produced much aerial root.

Leguminous Crop.

A moderate area of Mauritius bean and a lesser quantity of cowpea had been planted. This had germinated most favourably and was looking wonderfully well prior to the wind and rain. Unfortunately, over-much moisture ruined the greater part of this, therefore the planters' loss is great, for not only must it occasion more ploughings, but to this must be added seed losses and the non-restoring to the ground of the necessary humus.

Fertilisers.

The intelligent use of fertiliser and the time of application should be studied more. Little manure had been applied this month; a dressing of sulphate of ammonia was being applied to a field where the grass was quite as high as the cane, this seemed a great waste, for the grass, not the cane, would derive the benefit.

Pests and Diseases.

At present the cane seems wonderfully free from pest destruction. Several patches of grubs were found destroying cane stools prior to the rain. Leaf Scald was abundantly found in parts; H.Q. 426 variety and patches of the Goru family were troubled to a greater degree than N.G. 15. Since the wind this disease is harder to locate owing to the shattered nature of the leaves. Distinctive white or bleached markings, bordered by a watermark red colouration, is largely found in the more matured lower leaves and sheath of Badila, the under part of which sometimes contains much cobweb, and sometimes a fungus. Whether this is the cause of a secondary occurrence I do not know. These markings were first seen in the Babinda area many months ago.

Mill Overhaul.

The essential annual overhaul at all the local mills is now in progress. The extensive alterations and additions being made at the Mourilyan mill are progressing favourably, and should be finished some time in May. This progressive company, for many years past, has been gradually improving its plant; it is quite evident they realise the great importance of having an ever-efficient mill. The industrial dispute at the South Johnstone mill, lasting many weeks, has ended and work resumed on the 21st February. Some 1,850 tons of sugar had not been shipped owing to this trouble. Of this quantity about 400 tons had been loaded on to trucks and were exposed to the heavy rains, consequently it appeared damaged.

The Central Field Assistant, Mr. E. H. Osborn, reports (19*th January*, 1927):—

MACKAY.

When the December report was written, the very dry time then being experienced was causing much anxiety to growers throughout the Mackay district, and the prospects for 1927 were not at all promising. Luckily, however, very good to medium falls of rain were recorded soon after, and, as intense heat was also the order of the day, growing conditions were ideal, resulting in the young plant and earlier-cut ratoons moving along rapidly, but the greatest change for the better seems to have been felt by the late cut and backward ratoons, which soon responded to the welcome change.

Naturally, wood growth has also come along marvellously, and everywhere cultivation work was in full swing.

North Eton.

With only a short time at my disposal only a very few farms were visited, but it was noticed immediately that their share of the recent rainfall had not been sufficient to enable the cane to make its best growth, and upon examining the records it was seen that for last year Mackay registered 35.09 in. as against 25.70 in. for Eton, and for the month of December Mackay read 7.74 in. against 2.93 in. for Eton. In consequence the general growth was decidedly backward of both plant and ratoons, except in some odd places where very good crops were to be seen. One of the best of such was some 43 acres of April-to-July plant cane at Mr. E. Beldan's farm, looking particularly even in height and with a vigorous growth. This cane was made up into 10-ft. beds, and was mainly Q. 813, H.Q. 285, Pompey (7 R. 428), &c.

On an adjoining farm (Mr. J. Kelly's) lime was being used for the first time, and will very probably give satisfactory results upon such land. Here also was noticed some very decent M. 1900 and Q. 813.

Varieties.—Q. 813 planted late in December, 1925, and cut late in September, 1926, yielded 22 tons per acre with an average density of 16 c.c.s., whilst M. 1900, planted in April in the same paddock, near Hill End (north side), gave 26 tons per acre for the same c.c.s. Q. 813 and H.Q. 426 (Clark's Seedling) also gave very high density upon the northern side of the river at Dumbleton. (7 R. 428) Pompey in most cases gave only medium returns for density, but fair tonnages. E.K. 28 is gradually becoming more popular, in fact, so much so, that 17-acres of July-planted cane was observed upon the Eimeo road. This land had been ploughed three times with rotary plough attached to a Fordson tractor and once with a disc plough.

N.G. 15 (Badila), upon some of the river flats, was showing really good growth, and will now be assured of good tonnage.

Diseases and Pests.—Red Rot is still doing damage to M. 1900 and Black Innis in several parts of the Farleigh area. The latter cane is so partial to Rot and Mosaic that growers should be extremely careful about planting same.

Mosaic was noticed in second ratoon (Innis) at The Leap; the owner of same mentioned that Red Rot also was doing damage to this variety there.

In a farm adjacent to the Farleigh mill Mosaic was seen in the following canes:—

Malagache—second ratoons, bad.

7 R. 428—first ratoons, bad.

Imperial Standover—ratoons, very bad.

H.Q. 458—in young ratoons, very bad.

Innis—Plant exceptionally bad, and upon a neighbouring farm it was seen in Malagache, Badila, and Cheribon ratoons, and Malagache plant. Upon another nearby farm it was noticed slightly in D. 1135 ratoons. At North Eton, the disease was noticed in plants Innis and plant 7 R. 428.

With so many chances of infection it certainly is up to the grower to be very careful of seed selection.

Pests.—Rats at a Farleigh farm and beetles flying about, generally after the rain, were noticed in several places.

This year's prospects for a heavy crop are so far very promising; for while last year's rainfall only amounted to 35.09 in., January of this year has accounted for 11 in., spread over twenty-one wet days. February, to date, is represented by 6.81 in. for eleven wet days, and the prospects for further good falls seem well assured.

As this rain has been accompanied by great heat and mugginess, the crops have come away wonderfully, especially early plant and the earlier cut ratoons.

Grass and weeds are, of course, growing luxuriantly too, for there has been no chance of keeping them down during the very wet weather.

Farmers are now anxiously awaiting a little fine weather, otherwise the possibility of any early planting is very remote.

Cane Disease.—In last month's report mention was made of the prevalence of Mosaic on several farms in the vicinity of Farleigh mill. Since then another adjoining farm was also found to be heavily infested, as Mosaic was noticed throughout the some 50 odd acres under crop, plant and ratoons being alike infected. In fact, one block of plant cane carrying a fairly good growth otherwise, showed eighteen stools diseased in 100 counted; and this counting was taken haphazardly.

The canes grown were Black Innis, Malagache, Clark's Seedling, Pompey, E.K. 1, Cheribon, D. 109, and Shahjahanpur No. 10 (old ratoons).

Incidentally, wherever the writer has found No. 10 growing he has also found Mosaic. In common with many of the Farleigh farms this property contains some broken country hard to cultivate successfully, and carrying very heavy crops of grass (Blady and Guinea), and forming ideal conditions for the spread of Mosaic.

With such heavy infection, until new and clean seed is obtained elsewhere, losses are bound to increase every year. Mosaic being such an insidious disease is capable of causing enormous losses, and, as already mentioned, can only be fought with clean seed beds, seed selection, and eradication of all diseased stools. In the present

phase of the sugar industry this is absolutely necessary, for surely it is more payable to grow a smaller, clean area with good density and tonnage than a larger one infected with disease, and consequentially lower in density and tonnage—moreover with great possibilities of eventually losing the whole crop.

The writer emphasises this continually in some cases with success, but in many cases re-visits a farm where nothing had been done since his former visit in eradicating odd stools of diseased plant cane, despite promises to the contrary given at time of former visit.

Cane Varieties.—For the sake of growers who have not seen a copy of last year's annual report of the Bureau of Sugar Experiment Stations, the portion dealing with crop and analytical results of early and late maturing canes at the Mackay Station is appended.

Summarised, the land after ploughing out had cowpea sown which was ploughed under in March, was ploughed again in May, and ploughed and subsoiled in June, whilst the final ploughing was early in August, and the cane planted about the third week in August.

Fertilisers used consisted of—

100 lb. sulphate of ammonia per acre,
100 lb. nitrate of soda per acre,
75 lb. sulphate of potash per acre, and
300 lb. meatworks fertiliser

when the cane was about two months' old; and a top dressing of the following was used in December, *i.e.*—

50 lb. sulphate of ammonia per acre,
50 lb. nitrate of soda per acre.

The above mixture was used on both plant and ratoon (first).

Early Maturing Canes.

Variety.	Plant 13 months old.		First Ratoons. 10½ months old.		Averages for Two Crops.	
	Tons per acre.	C.C.S.	Tons per acre.	C.C.S.	Tons per acre.	C.C.S.
D. 109	45·1	12·92	26·7	14·07	35·9	13·50
H.Q. 285	32.6	15·48	23·9	15·42	28·2	15·45
H.Q. 426 (Clark's Seedling)	46·5	16·33	26·8	18·65	36·6	17·49
E.K. 28	47·7	17·02	28·5	17·79	38·1	17·40
Q. 813	48·4	16·58	31·5	17·12	39·9	16·85

Late Maturing Varieties.

	14½ months old.		11 months old.			
N.F. 24 (Goru) ..	42·2	14·28	23·1	15·17	32·6	14·22
M. 1900	41·9	16·60	22·8	16·45	32·3	16·52
7 R. 428 (Pompey) ..	47·3	14·84	36·1	14·23	41·7	14·53
N.G. 15 (Badila) ..	41·8	16·99	30·1	17·13	36·0	17·06
Cheribon	49·3	14·38	31·6	13·87	40·4	14·10

These figures give a striking instance of the value of judicious fertilising.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

LIFE HISTORY NOTES ON THE RUTHERGLEN BUG.

By J. HAROLD SMITH, M.Sc., Entomological Branch.

During the last few months of 1926, a severe outbreak of the Rutherglen bug (*Nysius* sp.*) occurred in Southern Queensland, in which a variety of crops were, in some cases, almost totally destroyed. The adults (Plate 65; figs. 7 and 8) were very prevalent at the time, and circumstances seemed opportune to enquire into the reproduction and development of the pest. Accordingly on receipt of instructions from the Chief Entomologist (Mr. Veitch) to this effect, field and laboratory observations were commenced in October and continued until December, by which time the pest had almost disappeared. The following notes are a summary of the information obtained up till now. They will, it is hoped, be supplemented as opportunities arise for further work.

REPRODUCTION.

Choice of Site for Egg-laying.

Eggs (Plate 64; fig. 1) of the Rutherglen bug have been detected on two weeds of the order Compositæ—namely, *Gnaphalium purpureum* (cudweed), and *Sonchus oleraceus* (sow-thistle), found in the neighbourhood of crops infested by the adults. The first of these, *G. purpureum*, appears the more important during the season of its growth, but at certain times of the year it is absent from many habitats. When this occurs other weeds of a similar kind, in addition to *S. oleraceus*, may serve as possible alternatives. In addition to the two plants mentioned, eggs have been noted on *Imperata arundinacea* (blady grass), and, as typical first and second instars have been collected on the flower heads of *Agaratum conyzoides* (Compositæ), it may be inferred that these had developed from eggs laid on this plant.

Under certain experimental conditions the behaviour of the bugs furnished further evidence in favour of the view that the female shows some discrimination in the choice of a site to place her eggs. If allowed access to complete plants of *G. purpureum*, mature flower heads of *S. oleraceus*, and compact cotton wool, by far the greater number of eggs were laid in the first. On omitting *G. purpureum* from the series, *S. oleraceus* was almost neglected, the eggs being deposited in the cotton wool. These observations suggest that, if available, plants which possess a fine down, such as occurs on *G. purpureum*, will be utilised for egg-laying in preference to others of a less suitable nature lacking this quality.

* The insect dealt with in this paper is the species that is generally referred to in Queensland as the Rutherglen bug. There is, however, some doubt as to its specific identity, and in order to remove any uncertainty on that point specimens have been forwarded to England for examination by taxonomic specialists. Recent references to the control of this pest can be found in the November and December, 1926, issues of the "Queensland Agricultural Journal," on pages 385 and 511 respectively. —R.V.

FIG 1

FIG 2

FIG 3

FIG 4

FIG 5

FIG 6

PLATE 64.

(*For Description of Plate, see page* 295).

Fig. 7

Fig 7a

Fig 7b

Fig 7c.

Fig. 7d

Fig 8

Fig 8a

Fig 8b

Fig 8c.

PLATE 65.

(*For Description of Plate, see page 295*).

Position and Arrangement of the Eggs.

Normally the oviposition site is on some part of the inflorescence, and, as the arrangement of the eggs and their disposition on the plant vary with the plant chosen, it is necessary to discuss each case separately.

Gnaphalium purpureum.—In this plant the inflorescences are axillary in position and clustered together in the form of a compact spike. The whole plant is more or less covered with fine down, but in certain parts, notably the concealed bases of the terminal inflorescences and the inner edges of the leaf bases, the soft covering may attain a considerable thickness and possess a loosely-woven texture. Eggs may be laid in this down wherever it occurs on the plant, but the majority are deposited where the covering is thickest. The depth to which the eggs are inserted is apparently determined by the thickness of the down or, should this be exceptionally dense, by the length of the ovipositor; hence they are rarely superficial in position. Though the eggs are usually laid singly, two or three may occasionally be closely apposed to form an irregular bundle, the eggs in which may be separated without much difficulty. On no occasion during laboratory work have eggs been located on the pappus of this plant.

Sonchus oleraceus.—The fine down characteristic of *G. purpureum* is almost absent on this plant, and the pappus of the mature flower heads is used instead for egg-laying. The eggs are formed into compact bundles which taper at either end, and contain from two to seven eggs. These bundles are attached to the lower half of the pappus, and a number of its silk-like threads may be wound together to ensure stability. As in the case of the rarer bundles found on *G. purpureum*, the adhesion between individual eggs is slight.

Imperata arundinacea.—On the few occasions that eggs have been found on this grass, they have been attached singly to the feathery awns of the seeds in the mature panicle.

Methods Adopted to Observe Egg-laying in Captivity.

Before a definite procedure was decided upon for breeding work, a good deal of experimenting was necessary to determine the most suitable food plant for observational purposes. *G. purpureum* was rejected on account of the inaccessibility of any eggs laid on the plant, and *S. oleraceus* was finally utilised, so treated by the removal of mature flower heads that it was unsuitable for oviposition. Under these conditions the bugs laid all their eggs in the only available site—viz., the cotton-wool stopper to the receptacle in which they were kept. By this means the bugs were maintained on a suitable diet and at the same time compelled to lay their eggs in a medium which allowed the exact determination of the number of eggs laid, the habit of laying, and other details of oviposition.

Females reared in the laboratory, and hence virgin, were mated with males also bred out under observation. Each pair was isolated as soon as possible after emerging from the final instar and placed in a wide tube some 5 inches in depth, the mouth of which was plugged with cotton-wool. Leaves and immature flower heads of *S. oleraceus* were used as food, but when the latter were unobtainable, and material in which the floral contents were visible was substituted, the floral parts were cut off. The bugs behaved quite normally in confinement, retaining

their usual vigour and reproducing without apparent restraint. Feeding and examination of the cotton-wool were made part of a daily routine, the dual operation being carried out systematically from 9 a.m. onwards. A period of approximately twenty-four hours would, therefore, elapse between consecutive examinations of any single pair of bugs.

Mating.

The male places himself alongside the female more or less violently, and while facing in the same direction makes attachment. Thus secured he swings slowly round until facing away from his mate. If disturbed shortly after uniting, the sexes readily separate, but if they have been in copulation for some time the union is much more secure. The duration of copulation is variable, sometimes momentary, sometimes extending over a number of hours.

The female is typically polyandrous, and the male polygamous.

The Act of Egg-laying.

Females have been observed on a number of occasions depositing eggs in the down of *G. purpureum* and in cotton-wool. In the case of the former it is difficult to follow the details of the process, and hence the following notes were compiled during oviposition in cotton-wool.

The female, about to lay eggs, moves over the potential site for some time prior to inserting the ovipositor into the compact mass of cotton-wool. Having raised the ovipositor from its resting groove until at right angles to the body, the bug plunges it into the fibrous mass to a depth of about one-tenth of an inch. In this position the abdomen is flexed downwards, exposing the pale upper surface beneath the outstretched wings. Usually the bug stands firm, forelegs upright, mid and hind pairs extended backwards, but sometimes the first two pairs may leave the surface, the bug being supported by the ovipositor and the hind pair of legs. The deposition of the egg is a momentary operation, and after partial withdrawal the ovipositor is thrust back into the neighbourhood of the egg already laid and a second placed close to the first. During the passage of the egg the bug is motionless. Subsequent examination showed that a number of eggs—one to fifteen—may be laid within a diameter of one-eighth of an inch without the complete withdrawal of the ovipositor. If during a single period of egg-laying the bug passes from one part of the cotton-wool to another, the ovipositor is carried loosely, not being returned to its resting position until egg-laying for the time being is suspended.

Females have been observed laying between the hours of 9 a.m. and 5 p.m., but only a small proportion of those under observation chose that period of the day for oviposition.

Period of Reproduction and Number of Eggs Laid.

To elucidate information under this heading, two series of mated bugs were kept under observation. Information regarding the first is summarised in Table I., and that dealing with the second series in Table II. The conclusions deducible from each series will be discussed separately.

Series I.—Six pairs are included here, mated between 22nd November and 1st December inclusive. The climatic conditions during

the greater part of their reproductive period were comparatively uniform, fine sunny days being the rule. Odd thunderstorms were experienced, but these did not effect any noticeable change in the egg-laying of the bugs.

Between mating and reproduction a period of from four to nine days elapsed, during which the sexes were intermittently in copula. Having commenced to lay, the number of eggs increased until the daily maximum was reached. This maximum ranged from twenty-four to forty-five eggs per day in the individual records. This period of active oviposition continued for a short time and then diminished, and was in some cases succeeded by a second (vide Table I.; cases G 1 and G 3) and even a third (vide Table I.; case G 1), while in others it was followed by spasmodic egg-laying (vide Table I.; cases G 2, G 5, and G 6). In those cases where a rhythm is apparent, the periods last approximately a week, and successive stages have a diminishing daily maximum. The interval between any two periods may (vide Table I.; case G 3), or may not (vide Table I.; case G 1), be characterised by a complete absence of egglaying. The total reproductive period ranged from thirteen to twenty-five days, and the number of eggs per female from 134 to 435.

Observation was continued for some time after egg-laying had ceased, but usually the death of either one or both individuals ensued within a few days of the cessation of oviposition.

Series II.—This series consisted of eighteen pairs mated between 6th December and 13th December. Shortly after mating the first pair, the weather, previously unsettled, definitely broke, and sultry wet weather coincided with the oviposition of the bugs under observation. The insects lacked their usual active habits and appeared sexually indicisive with slight inclination to copulate. This disposition of the bugs found evident expression in tardy and irregular egg-laying in most instances.

Traces of the rythmic mode of oviposition are suggested in the records for cases I 2, I 5, and I 8 (Table II.), but each of these is less significant than those cited in the first series. Egg-laying proceeded irregularly in many cases and the total number of eggs deposited per female proved to be much smaller than in Series I. The period of reproduction varied from one to fifteen days and the total number of eggs per female from 3 to 200.

DEVELOPMENT.

Methods of Studying Development in Captivity.

In studying this aspect of the life history of the Rutherglen bug, two successive generations were reared, the nymphs (Plate 64; figs. 2 to 6) being confined in wide tubes identical with those described previously in connection with the work on reproduction. *G. purpureum* was supplied to the first brood as food, but the available supply of this weed was exhausted when the second was commenced. Leaves and immature flower heads of *S. oleraceus* proved an efficient substitute, if such flower heads were first lacerated to provide a ready flow of sap.

Two distinct systems of recording were used in observing the essential facts of development. These may conveniently be explained as group recording and individual recording of the various stages.

Group Recording.—A convenient number of bugs is segregated as soon as the nymphs emerge from the eggs. On commencing to moult into the second instar a period of two or three days may elapse before all have changed. As the second instars appear those emerging on any one day are kept separate and their subsequent development followed. Thus the initial batch of first instars divides into two or three smaller lots at the first moult and each of these in turn subdivides at the second. In this manner the original group splits up as development proceeds and the changes may be recorded somewhat on the style of a genealogical tree.

Individual Recording.—Single specimens are observed throughout the whole period of their development. It is not practicable to handle as many specimens by this system of recording as in the former, but it ensures accuracy if the successive instars are not readily separable on structural characters. In the case of the Rutherglen bug the several stages are quite distinct, and the relative merits of either system of recording do not, therefore, require further discussion.

Data for the first generation were arranged on the group recording system, individual records being kept for the later brood.

Nature of Development and Duration of Stages.

The Rutherglen bug belongs to the family Lygæidæ of the order Hemiptera. The nymph passes through five instars in the course of its development, maturing at the fifth moult. The most marked changes in structure are to be seen in the fourth and fifth instars, when the wing rudiments become visible. The duration of each stage in development will be considered separately.

Incubation Period of Egg.—Some 296 eggs laid in the laboratory were used in the determination of the incubation period. The data summarised in Table III. show that the embryonic period at this time of the year (October and November) is six days, most of the eggs hatching in that period. The high percentages of failures must not be regarded as entirely due to embryonic mishaps and other natural causes. The incubation period was determined prior to the elaboration of the technique previously described in connection with egg-laying in captivity and the eggs used were extricated from the fine down of *G. purpureum*. The difficulties attending their removal from this plant were probably responsible for a higher percentage of losses than would have been the case if oviposition had taken place in the cotton-wool used for this purpose at a later date.

Duration of the First Instar (vide Table IV).—In both generations the greatest number of individuals moulting on any one day passed into the second instar after five days. In many cases, however, a longer or shorter interval was taken, the extremes being three days the minimum, and eight days the maximum. Occasional specimens may insert an additional instar between the typical first and second.

Duration of Second Instar (vide Table IV.).—The records of both generations roughly correspond in showing that the usual period for this stage in the development of the bug is three or four days. Most specimens moulted before four days had elapsed but a few persisted for a longer time.

Duration of Third Instar (vide Table IV.).—Here alone of all the nymphal data, a disparity is evident in the records for the duration of an instar. The group records for the first generation indicate that the greatest number of individuals moulting on any one day passed into the fourth nymphal stage after three days, whereas the second brood required four days. A range from two to nine days in the duration of this instar is recorded but the specimen requiring the higher limit was doubtless a pathological variant, as death ensued shortly after it moulted into the fourth instar.

Duration of Fourth Instar (vide Table IV.).—The usual period is three or four days but some specimens require a longer or shorter period than this. Isolated bugs introduced an extra instar here, but no corresponding change in structure could be associated with it.

Duration of Fifth Instar (vide Table IV.).—Five days is the normal period taken by this, the final nymph, from which, on moulting, the adult bug emerges.

In a number of instances the development of the bug was completed in four instars instead of the usual five. Two individuals in the first generation and five in the second were noted as behaving in this manner. During the third nymphal stage all these specimens developed wing pads and other structural characters, typical of the fourth instar, without an intervening moult.

Total Period of Development.

In Table V., the total period required to complete the post-embryonic development of the bugs, *i.e.*, the time from the hatching of the eggs to the emergence of the adults, is set out. The data are arranged according to the sex of the adult. In both sexes the greatest number of individuals for any particular interval are seen to complete their development in twenty days. Adding to this representative period the six days in which the eggs incubate it is clear that the total period of development, embryonic and post-embryonic, is approximately four weeks. This conclusion seems true of both the generations reared.

Description of Moult.

The integument of the thorax ruptures in two directions, medianly in the longitudinal axis, and anteriorly, in the transverse axis, the two ruptures forming a T-shaped rent. After the bug has forced its way out of the nymphal skin, the exuvium is left behind, intact save for the actual fissure through which the bug has passed. Mishaps during the change are of rare occurrence, but occasionally the emerging nymph is unable to rid itself completely of the cast skin. An interval of some hours elapses after the moult before the typical markings of the instar are distinct, and during the early part of this period the nymph is more or less quiescent.

Proportion of the Sexes.

Field catches of the Rutherglen bug at an early stage in this work showed a preponderance of males. In the laboratory 81 adults were reared, and 45 of this number were males, this sex having a dominance of 25 per cent. over the female.

Habits of the Instars.

These records are collated from data secured both in field and laboratory studies and concern chiefly the feeding habits of the instars.

First Instar.—Immediately on hatching this instar is active, but if food is available close at hand, shows little disposition to wander. Thus bugs which have recently hatched from eggs *in situ* on *G. purpureum* burrow amongst the soft down within a very limited range. If reared on the lacerated flower heads of *S. oleraceus* the bugs remain quiescent just as long as the food is fresh and the sap oozes freely from the injured plant tissue. Should the quality of the food prove unsuitable this instar is active and quite capable of seeking out fresh supples.

Bugs hatched in the laboratory apart from any host plant may occasionally pass into the second nymphal stage without feeding. This is, however, exceptional.

Second Instar.—No essential differences in habit of the first two instars have been recorded. The second instar is more active than the first, better able to locate a suitable food supply, and can pass from plant to plant in search of it without difficulty. The early instars are very sensitive to unsuitable food, and attempts to rear the bug on the leaves of *S. oleraceus* were almost total failures, though if supplied with semi-mature flower heads of the same plant, development was normal.

Third Instar.—Bugs in this stage, while partial to the floral parts of the plants on which they were reared, could, in the third and subsequent instars, be maintained on the stems and leaves only of *S. oleraceus*, provided that such were fresh and succulent.

In the field, bugs of the third, fourth, and fifth stages have been found roaming over the surface of the soil, frequently sheltering around the base of various plants other than those on which their early life is passed. At this stage they appear partial to the squat, spreading pigweed, *Portulacca oleracea* (Portulaceæ), on which plant the later instars have been observed in large numbers.

Fourth and Fifth Instars.—No significant change in habit from the third instar has been noted. They show a greater resistance to adverse conditions than earlier forms.

The gregarious habits characteristic of some bugs appear to be absent in all the nymphal instars of this species.

Injury to the Plant.

The actual damage to cultivated plants in all cases observed was entirely the work of the adults, the development of the bug being apparently completed on weeds before the invasion of the crop took place. Practically all cultivated plants are subject to attack in some degree, but as direct observation has been restricted to three—potato, beetroot, and citrus—discussion will be confined to these. The severity of the injury depends on several factors, the habit of growth of the plant, the accessibility of its commercially valuable products, and its development at the time of attack. It seems necessary, therefore, to describe the specific injury to the three crops on which observations have been made.

Potatoes.—The removal of the sap from the leaves which succeeds the initial act of piercing cause a pronounced wilt, and ultimately

death to the parts of the plant attacked. Terminal shoots usually suffer first, but on the exhaustion of these the bugs attack the older parts of the plant and ultimately the whole may be killed outright. If the onset of large scale infestation takes place during the early stages of the plant development, *i.e.*, prior to setting of tubers, the plant resources are used to renew losses in foliage attributable to the bug. Lateral shoots open out only to be attacked by the bug, and finally, while the plant may retain some vestige of life, the quantity of tubers developed is small. Should tuber formation have commenced prior to the attack attaining economic dimensions the case is somewhat different. Fresh foliage is only sparingly produced, the food reserves of the plant being diverted to the as yet immature tubers. The development finally reached by these is determined by the further life of the plant. In many cases noted the final crop comprised the normal number of tubers, but these were of little value for, apart from a certain quantity of seed size, the bulk were too small to be marketable.

Beetroot.—The feeding habits of bugs found on this plant are such that any wilting observed is not the aftermath of suction from the leaf surface, but follows a concerted attack on the leaf base by large numbers of bugs located at the head of the semi-formed root. The final effect is similar to that noted in the previous crop, the affected leaves ceasing to function and plant development being retarded. A certain portion of the crop may be marketable, its dimensions being determined by the severity of the infestation, the development reached before its commencement, and the period of its duration. In crops of this vegetable, the distribution of the bug appears a trifle sporadic, plants in a small area being overrun with the bugs while others a few yards away appear comparatively free. The same phenomenon was prevalent in lesser degree where potatoes were suffering.

Citrus.—The sucking habit is exercised on both foliage and the young newly-set fruit. As the latter is the potential marketable fruit, the injury is most important when the bugs are present in sufficient numbers to penetrate and repenetrate the fruits. In one orchard the young fruits without exception showed, on examination, evidence of repeated puncturing, and from the openings so formed the sap oozed out steadily. Frequently numbers of these punctures in close proximity to one another had calloused over, leaving an unsightly blemish which would probably persist in the mature fruit. This united attack on the fruit was the serious feature in the case under observation and, in comparison, that on the leaves was negligible. The withdrawal of the sap essential to the normal growth of the fruit at such an early stage in its development cannot other than induce an ultimate crop of small fruits, unevenly developed and deficient in juice. Considerations of the duration and severity of the infestation again influence the extent of the final loss.

SUMMARY.

1. A severe outbreak of the Rutherglen bug occurred in Southern Queensland during 1926, and the reproduction and development of this pest were studied in the Brisbane district from October to December of that year.

2. Egg-laying may occur on weeds in the vicinity of infested crops. *Gnaphalium purpureum* (cudweed) is apparently the plant most frequently used for oviposition during this season, but others, especially

Sonchus oleraceus (sow thistle) may serve as alternatives. The actual site of the eggs and their arrangement varies with the plant on which they are laid, and the more important of these are discussed.

3. The details of copulation and egg-laying are recorded. Two series of bugs were observed during reproduction in captivity, and it is shown that the period of reproduction may extend over twenty-six days. The maximum number of eggs laid per female was 435. The daily progress of oviposition is discussed.

4. Two successive generations of the bugs have been reared and from the data obtained it is seen that the total period of development at this time of the year is approximately four weeks. There are five nymphal stages, the duration of each of which is recorded. The habits of the instars are described.

5. Observations have been made on three infested crops—potato, beet, and citrus. A description of the characteristic injury to each is given.

6. An exact description of the several stages in development and tables summarising laboratory data are given as appendices.

Acknowledgements.

I have to acknowledge suggestions made during the course of this work by various members of the Entomological staff. In particular I am indebted to Mr. Veitch, the Chief Entomologist, for much valuable advice and criticism, and Mr. Helmsing for preliminary information on the breeding grounds of the pest in addition to the excellent illustrations from his pen.

DESCRIPTION OF PLATES.

PLATE 64.

Fig. 1.—Egg x 18.

Fig. 2.—1st nymphal stage x 20.

Fig. 3.—2nd nymphal stage x 20.

Fig. 4.—3rd nymphal stage x 20.

Fig. 5.—4th nymphal stage x 20.

Fig. 6.—5th nymphal stage x 20.

PLATE 65.

Fig. 7.—Adult female, dorsal view x 6.

Fig. 7*a*.—Adult female, ventral view x 6.

Fig. 7*b*.—Adult, head and mouth parts, lateral view x 6.

Fig. 7*c*.—Forewing, female x 12.

Fig. 7*d*.—Hindwing, female x 12.

Fig. 8.—Adult male, dorsal view x 6.

Fig. 8*a*.—Adult male, ventral view x 6.

Fig. 8*b*.—Forewing, male x 12.

Fig. 8*c*.—Hindwing, male x 12.

APPENDIX I.

Description of Stages.

During the breeding work large numbers of each instar were available for examination. The following descriptions were made from representative specimens shortly after moulting, as soon as the typical pattern and colours were distinct. As usual in bug instars, the range of colour variation was large, though the pattern of the markings appeared somewhat stable. Variations noted were usually due to differences in the intensity of the colour in individual cases. The measurements given here are those usual in the stage to which they refer, but as deviations in size from the normal are frequent they must not be interpreted too rigidly.

EGG (Plate 64; Fig. 1).

Length 1 mm.; maximum diameter .25 mm.

Shape, elongate oval, slightly allantoid; *colour,* first day creamy white, second and third days creamy white with bright red spots, sixth and seventh days dark fuchsia, iridescent; *armature,* tuberculate at micropylar end; *emergence,* latero-terminal via a broad fissure, embryonic membranes remain attached to the armature as a fan-shaped appendage, one-third length of collapsed egg.

FIRST INSTAR (Plate 64; Fig. 2).

Length .75 mm.; maximum width .3 mm. Shape roughly rectangular.

Head: Large triangular, one-quarter length of body; colour amber with indistinct brown symmetrical longitudinal stripes dorsally. *Eyes:* Ruby, prominent at the base angles of the head; facets few and large. *Antennæ:* Four segmented, with proximal tubercle dark brown; two-thirds length of body; segment 1 translucent, sparsely pubescent; segments 2 and 3 subequal, each longer than first, amber distally, sparsely pubescent; segment 4 elongate oval, equals 2 plus 3 in length, pale brown to pink in colour, densely pubescent. *Rostrum:* Four segmented, three-quarters length of body; segment 1 short, stout, especially at junction to head, few stout hairs at point of insertion, labrum elongate; segment 2 long, twice length of first, fulvous; segment 3 slightly shorter than second, fuscous; segment 4 elongate, tapering distally, dark brown, longer than second.

Thorax: Prothorax and mesothorax dark brown dorsally, save a pale intersegmental longitudinal median streak; metathorax fulvous, save antero-lateral corners dark brown; lateral edge milk white; coxal region pale, rest of ventral surface brown. *Limbs:* Coxæ large, conical, translucent; trochanters small, translucent; femora stout, first and second pairs dusky, hind pair brown, sparsely pubescent; tibia translucent with stout hairs; tarsi densely pubescent, two segmented, with stout paired claws, paired capitate pulvilli and two stout median hairs.

Abdomen: Seven visible segments dorsally; colour fulvous with a mosaic of reds in each segment, sometimes asymmetrical but usually concentrated in three conspicuous dots, two antero-lateral, one postero-median; distinctly ledged. *Anal ring:* Sclerites almost black. *Odoriferous glands* open on fifth visible segment dorsally; evaporating area ill defined.

SECOND INSTAR (Plate 64; Fig. 3).

Length 1.25 mm.; maximum width .5 mm.

Head: Triangular; dorsal ground colour fulvous, with three pairs of symmetrical stripes, ruddy brown in colour, almost parallel to the margin of the eye-socket. *Eyes:* Ruby, socket ledged. *Antennæ:* Four segmented, socket projecting from side of head; segment 1 short, stout, sparsely pubescent; segments 2 and 3 subequal, each longer than first, sparsely pubescent; segment 4 large, elongate oval, equals segments 2 plus 3, dull brown, densely pubescent. *Rostrum:* Four segmented, reaching just beyond the hind coxæ; segment 1 stout, dark brown, labrum elongate, sparsely pubescent; segments 2 and 3 subequal, elongate, pale brown, sparsely pubescent; segment 4 elongate, tapering distally, dark glossy brown, slightly longer than segment 2.

Thorax: Segments of approximately equal thickness but widen out posteriorly; prothorax and mesothorax with lateral dark brown bands merging into a median fulvous area; a pale longitudinal dorsal stripe extends medianly over the thorax; antero-dorsal corners of metathorax dark brown, the rest of the segment consisting of a transverse arch, fulvous with uniformly spaced red dots; ventrally the thorax is irregularly dull brown in colour. *Limbs:* Coxæ large, conical, translucent;

trochanters small, translucent, sparsely pubescent; femora stout, hind pair dusky, pubescent at proximal end; tibia broadens distally, stout hairs especially at apex; tarsi, approximately equal to tibia, two segmented, with paired claws, paired pulvilli and paired hairs between the claws.

Abdomen: Eight visible segments dorsally; colour fulvous with ornate red markings, usually emphasised laterally. *Odoriferous glands* open on dorsal hind margin of 4th and 5th apparent segments; evaporating areas pale. *Anal ring*: Sclerites dark, with projecting hairs.

THIRD INSTAR (Plate 64; Fig. 4).

Length 1.5 mm.; maximum width .75 mm.

Head: Triangular; dorsal markings as in Instar II., longitudinal stripes sepia brown throughout length; hind margin dark brown, ventral surface dull-red with lateral pale stripes merging into the milk-white band to the eye-socket. *Eyes:* Prominent, deep red. *Antennæ:* Four segmented, with joints pale; tubercle pale but distinct; segment 1 short, stout, and dark, sparsely pubescent; segments 2 and 3 subequal, longer than first, dusky, sparsely pubescent; segment 4 elongate oval, almost equal to segments 2 plus 3 in length, dull brown, densely pubescent. *Rostrum:* Four segmented, reaching the hind coxæ; segments approximately equal in length; labrum extends to hind margin of head; a few stout hairs at the insertion to the head; segment 1 dark brown, labrum almost black; segment 2 fuscous, longer than first; segment 3 fuscous same length as second; segment 4 stout proximally, tapering distally, almost black, equal in length to second.

Thorax: Segments structurally distinct; dorsally dull brown with lateral edges milk-white; pale median stripe distinct; antero-ventral margin of prothorax milk-white; irregular dark brown markings round the acetabular region. *Limbs:* Coxæ large, conical, translucent; trochanters small, translucent; femora dark, stout, and sparsely pubescent; tibia translucent, with stout hairs, especially distally; tarsi two-jointed with paired claws and paired capitate pulvilli.

Abdomen: Eight or nine segments visible dorsally, each with a symmetrical mosaic of red markings on a fulvous ground colour. *Odoriferous glands* open dorsally on hind margins of segments 4 and 5; evaporating areas pale. *Anal ring* with sclerites almost black, setiferous.

FOURTH INSTAR (Plate 64; Fig. 5).

Length 1.75 mm.; maximum width .85 mm.

Head: Triangular with sepia brown dorsal stripes as in previous instars, but broader and less regular in outline; ventral surface uniformly deep red with pale lateral stripes which join the milk-white band to the eye-sockets. *Eyes:* Prominent, reddish-brown; sockets ledged. *Antennæ:* Four segmented; tubercle pale distinct; segment 1 dark, stout; segments 2 and 3 dusky, subequal in length, each larger than first, slightly pubescent; segment 4, elongate oval, dark brown often glossy, densely pubescent. *Rostrum:* Four segmented, segments approximately equal, just reaching hind coxæ; insertion to head surrounded by pale ring and fringed with a few stout hairs; segment 1 stout, almost black with labrum distinct; segments 2 and 3 dark, fuscous; segment 4 elongate oval, tapering distally, dark brown.

Thorax: Prothorax broad, divided into two parts by a transverse dark band, anterior enclosed dorsally by lateral extensions of posterior portion; irregular longitudinal bands dark brown, anterior ventral margin milk-white; mesothorax with wing buds present, hind margins almost black, longitudinal bands of prothorax continuous into proximal part of wing pads, a pale "M" often fills the inter-alar space; metathorax small and indistinct between the mesothoracic wing pads, pads small within the mesothoracic pair, dark with a distinct spot; thorax bordered with a milk-white lateral fringe, ventral surface dull-brown. *Limbs:* Coxæ, large, conical, translucent; trochanters small, pale, fulvous; femora dark brown save distal end pale, sparsely pubescent; tibia pale fulvous, with scattered stout hairs especially at distal end; tarsi two-jointed with stout paired claws and paired pulvilli.

Abdomen: Eight or nine apparent segments dorsally, each with a mosaic of reds on the fulvous ground colour. *Odoriferous glands* open dorsally on apparent segments 4 and 5; evaporating areas pale. *Anal ring* termino-ventral with adjacent sclerites dull-black.

FIFTH INSTAR (Plate 64; Fig. 6).

Length 2.25 mm.; maximum width 1.25 mm.

Head: Triangular; dorsal stripes as in fourth instar, broad and irregular; ventral surface dull brown with lateral pale streaks merging into the pale white band to the eye-sockets. *Eyes:* Prominent, dull brown; socket ledged, glossy black. *Antennæ*: Four segmented, joints pale, tubercle distinct; segment 1 short, stout, fuscous, slightly pubescent; segments 2 and 3 subequal, longer than first, fuscous, sparsely pubescent segment 4 large, two-thirds length of segments 2 plus 3, elongate oval, dark brown, densely pubescent. *Rostrum:* Four segmented, with a pale ring around the point of insertion which is fringed with a few stout hairs; segment 1 stout, reaching hind margin of head, dark brown, save labrum almost black; segment 2 longer than first, fuscous; segments 3 and 4 dark glossy brown, third short, ultimo equal to 2 in length tapering to a blunt point; rostrum reaches hind coxæ.

Thorax: Prothorax divisible into three parts by transverse dark bands, anterior two enclosed by lateral extensions of the third; dorsal markings dull brown, irregular; mesothorax with prominent wing pads, striped proximally, glossy black at hind margins, inter-alar space filled with a dull brown circular area; metathorax with wing buds partly visible within the mesothoracic pair, wing pads show as dull white with a median dark blotch. *Limbs:* Coxæ large conical, translucent; trochanters small, dark brown; femora fuscous save distal end pale, sparcely pubescent; tibia pale brown with stout hairs distally; tarsi two-jointed with paired claws densely pubescent.

Abdomen: Eight or nine segments visible dorsally, each with a mosaic of reds on a fulvous background. *Odoriferous glands* open dorsally on hind margins of segments 4 and 5, evaporating areas extensive. *Anal ring* with sclerites dull black.

IMAGO ♀ (Plate 65; Fig. 7).

Length 4.5 mm.

Head: Jet black, densely pubescent except at hind margin. *Eyes* prominent at base angles of head, black; ocelli paired, wide apart, ruby red in colour. *Antennæ:* Four segmented, length approximately 2 mm., socket paler than rest of head; tubercle distinct, dark glossy brown; segment 1 short stout fuscous, darkening distally, densely pubescent; segment 2, length two and a-half times the first, uniformly fuscous, pubescent; segment 3, length twice the first fuscous, pubescent; segment 4 elongate oval, equal to third in length, uniformly fuscous, densely pubescent. *Rostrum:* Four segmented, reaching just beyond the hind coxæ, marginal hairs at the point of insertion; segment 1 fuscous reaching ventral hind margin of the head, labrum elongate; segment 2 elongate, darker than the first; segment 3 plus 4 equal segment 2 in length; ultimo tapering, almost black in colour.

Thorax: Prothorax large, uniformly punctate and densely pubescent; an irregular transverse band, finely tuberculate divides prothorax into two parts; antero-ventral margin milk white; mesothorax with scutellum densely pubescent. *Wings:* Forewing, clavus dull brown distally; corium divided into three parts by a forked vein, the outer arm of which may or may not reach the margin of the membrane; membrane with irregular longitudinal veins and an inner forked vein. Hind wing membraneous with irregular venation consisting usually of a double fork along the costal margin and indistinct anal veins; anal lobe large. *Limbs:* Coxal plates milk white; coxæ large, conical, smoky, pubescent; trochanters small, translucent; femora stout, fulvous with irregular brown blotches, pubescent; tibia elongate, fulvous and pubescent; tarsi three segmented, segments 1 and 3 deep brown in colour, segment 2 fulvous, all densely pubescent, claws stout, paired pulvilli. *Odoriferous glands* paired open on the metasternum, evaporating areas large and pale.

Abdomen: Seven apparent segments ventrally, the last four modified to form a groove for the ovipositor; colour fulvous, never black; densely pubescent.

IMAGO ♂ (Plate 65; Fig. 8).

Length 3.5 mm.

The description of the opposite sex will serve for the male also with the following qualifications:—

Limbs: Femora darker though still spotted, hind pair almost uniformly dark.

Abdomen: Eight apparent segments ventrally, the third much broader than the rest; segmental arrangement normal without modification. Median depression on ventral side of segment 8. Colour jet black, not fulvous as in the female.

Table I.

OVIPOSITION DATA—SERIES I.

Serial Number of Mated Bugs.	Date of Mating.	Number of Eggs Laid on Date Indicated.																											Total Number of Eggs.	Period of Oviposition in Days.
		November.					December.																							
		26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
G 1 ..	22-11-26	18	10	25	35	32	36	7	9	14	26	22	8	3	19	14	9	8	0	0	5	..	..	..	..	..	..	..	..	301	20
G 2 ..	22-11-26	..	..	9	18	24	21	9	6	0	0	4	2	5	0	0	2	1	0	10	2	2	4	1	8	0	0	6	..	134	25
G 3 ..	23-11-26	..	..	11	45	33	31	27	29	27	28	24	0	6	34	30	23	28	32	14	12	1	0	..	..	..	..	..	..	435	19
G 4 ..	23-11-26	..	..	12	25	24	21	24	27	23	25	35	29	17	14	5	0	..	..	..	..	..	..	..	..	..	..	..	..	281	13
G 5 ..	29-11-26	..	..	..	..	..	..	..	10	20	18	24	34	0	3	8	0	1	5	13	0	0	6	2	5	0	0	..	..	149	17
G 6 ..	1-12-26	..	..	..	..	..	..	..	..	..	10	20	29	24	21	25	23	29	12	25	16	0	0	0	12	11	0	0	2	259	19

Total reproductive period, 13 to 25 days.

Total number of eggs per female, 134-435.

Table II.

OVIPOSITION DATA—SERIES II.

Serial Number of Mated Bugs.	Date of Mating.	Number of Eggs Laid on Date Indicated. December.															Total Number of Eggs.	Period of Oviposition in Days.
		10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	24th	25th		
I 1	6–12–26	..	..	5	1	0	0	0	0	0	0	0	..	..	..	..	..	6	2
I 2	7–12–26	..	..	29	32	35	13	0	15	19	12	14	0	0	0	0	0	169	9
I 3	7–12–26	..	27	32	14	0	..	..	..	..	..	..	..	..	..	..	..	73	3
I 4	7–12–26	7	0	27	51	3	0	0	5	4	9	14	0	0	0	7	0	127	15
I 5	7–12–26	..	23	19	21	24	11	0	2	10	16	28	16	22	8	0	0	200	13
I 6	7–12–26	..	10	4	0	0	0	2	2	3	4	6	0	0	0	..	..	31	10
I 7	8–12–26	..	..	9	11	6	0	..	..	..	..	..	..	..	..	..	..	26	3
I 8	8–12–26	..	..	31	35	19	24	14	3	3	3	23	4	2	0	..	..	161	11
I 9	8–12–26	..	..	..	..	..	2	2	2	2	0	2	..	..	..	..	..	10	6
I 10	9–12–26	..	..	..	..	..	..	..	..	3	0	0	4	0	0	..	..	7	4
I 11	9–12–26	..	..	..	..	..	..	..	..	3	0	0	0	0	..	..	..	3	1
I 12	10–12–26	..	..	9	16	31	8	10	13	6	11	15	8	24	3	0	..	154	12
I 13	10–12–26	..	..	..	4	0	0	2	12	4	10	12	0	0	0	..	..	44	8
I 14	11–12–26	..	..	..	..	16	0	0	0	0	0	6	2	11	..	..	..	35	9
I 15	11–12–26	..	..	..	..	..	..	..	8	6	24	25	10	13	4	0	..	90	7
I 16	13–12–26	..	..	..	..	..	..	2	0	2	2	0	..	..	..	..	..	6	4
I 17	13–12–26	..	..	..	..	..	5	6	3	1	7	20	12	10	6	0	..	70	9
I 18	13–12–26	..	..	..	..	..	..	..	..	..	..	..	7	0	1	0	..	8	3

Total reproductive period, 1 to 15 days.

Total number of eggs per female, 3 to 200.

Table III.

INCUBATION PERIOD OF EGGS.

Date of Oviposition.	Number of Eggs Laid.	Number of Eggs Hatching in 4 days.	Number of Eggs Hatching in 5 days.	Number of Eggs Hatching in 6 days.	Number of Eggs Hatching in 7 days.	Number of Eggs Hatching in 8 days.	Number of Eggs failing to Hatch.
25–10–26	16	..	1	1	10	2	2
26–10–26	28	..	..	18	7	..	3
27–10–26	38	..	2	25	8	..	3
28–10–26	43	..	2	24	7	3	7
29–10–26	55	..	2	38	5	..	10
30–10–26	28	1	2	18	4	..	3
31–10–26	47	..	2	31	3	2	9
1–11–26	38	..	3	15	11	2	7
2–11–26	3	..	..	2	..	..	1
Totals ..	296	1	14	172	55	9	45

Normal Incubation Period, 6 days.

Table IV.

DURATION OF INSTARS.

Instar.	Duration of Instar in Days.	1	2	3	4	5	6	7	8	9
I.	Number of Specimens—									
	Generation 1	..	..	12	5	35	16	9	..	..
	Generation 2	..	..	5	11	18	9	2	1	..
	Total	..	..	17	16	53	25	11	1	..
	Normal Duration, 5 days.									
II.	Number of Specimens—									
	Generation 1	1	8	22	11	9	5	4	1	1
	Generation 2	1	7	15	14	2	1	2	1	..
	Total	2	15	37	25	11	6	6	2	1
	Normal Duration, 3 or 4 days.									
III.	Number of Specimens—									
	Generation 1	..	11	20	9	7	5	1	0	1
	Generation 2	..	1	8	20	8	2	1	..	..
	Total	..	12	28	29	15	7	2	0	1
	Normal Duration, 3 or 4 days.									
IV.	Number of Specimens—									
	Generation 1	3	5	14	15	8	3	..	..	..
	Generation 2	..	3	10	17	2	..	..	..	..
	Total	3	8	24	32	10	3	..	..	..
	Normal Duration, 3 or 4 days.									
V.	Number of Specimens—									
	Generation 1	..	..	6	8	24	6	1	..	..
	Generation 2	..	..	..	5	22	1	..	..	..
	Total	..	..	6	13	46	7	1	..	..
	Normal Duration, 5 days.									

Summary.

Normal Duration of First Instar, 5 days.
Normal Duration of Second Instar, 3 or 4 days.
Normal Duration of Third Instar, 3 or 4 days.
Normal Duration of Fourth Instar, 3 or 4 days.
Normal Duration of Fifth Instar, 5 days.

Table V.—TOTAL PERIOD OF POST EMBRYONIC DEVELOPMENT.

Brood.	Number of Bugs Requiring the Period Indicated.																	
	♀								♂									
	Days.								Days.									
	18	19	20	21	22	23	24	25	17	18	19	20	21	22	23	24	25	26	27
Generation 1	..	2	10	5	2	1	1	..	1	4	1	5	2	2	1	4	1	2	1
Generation 2	1	..	7	1	3	2	..	1	..	..	6	7	7	..	..	..	1	..	..
Aggregates	1	2	17	6	5	3	1	1	1	4	7	12	9	2	1	4	2	2	1

Normal Duration of Post Embryonic Development in both sexes, 20 or 21 days.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING FEBRUARY, 1927 AND 1926, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Feb.	No. of Years' Records.	Feb., 1927.	Feb., 1926.		Feb.	No. of Years' Records.	Feb., 1927.	Feb., 1926.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	9·19	25	21·42	3 71					
Cairns	15·00	44	37·38	3 78	Nambour	8 73	30	8·72	0·82
Cardwell	16·86	52	38·13	7·16	Nanango	4·17	44	2·44	1·10
Cooktown	13·19	50	15·19	3·42	Rockhampton ...	7·26	39	3·67	2·34
Herberton	7·42	39	17·53	2·27	Woodford	8·49	39	2·76	0·04
Ingham	15·43	34	36·27	16·80					
Innisfail	21·96	45	45·42	8·51					
Mossman	15·09	13	26·56	4·94					
Townsville	11·41	55	20·02	13·91	*Darling Downs.*				
					Dalby	2·81	56	3·59	0·12
Central Coast.					Emu Vale... ...	2·31	30	2·25	
					Jimbour	2·74	38	1·87	0 06
Ayr	8·94	39	14·74	8·11	Miles	2·70	41	3·30	1·11
Bowen	8·84	55	7·09	12·20	Stanthorpe ...	3·24	53	1·38	1·40
Charters Towers ..	4·57	44	3·41	2·04	Toowoomba ...	4·26	54	4·06	1·85
Mackay	11·49	55	8·47	4·05	Warwick	3·07	61	1·67	0·20
Proserpine	11·80	23	9·55	8·20					
St. Lawrence ...	7·86	55	4·13	1·01					
					Maranoa.				
South Coast.									
					Roma	3·10	52	1·74	0·66
Biggenden	3·87	27	2 90	0·26					
Bundaberg	5·08	43	4·29	1·41	*State Farms, &c.*				
Brisbane	6·18	76	5·37	1·18					
Childers	5·94	31	5·12	0·32	Bungeworgorai ...	2·68	12	1·71	0·98
Crohamhurst ...	12·53	35	4·25	0·26	Gatton College ...	3·16	27	2·43	0·55
Esk	5·26	39	5·17	0·76	Gindie	3·03	27	1·68	0·68
Gayndah	4·19	55	3·58	0·31	Hermitage ...	2·29	20	2·15	0·40
Gympie	6·54	56	3 38	0·69	Kairi	8·51	12	22·76	3·39
Caboolture	7·33	39	3·51	0·24	Sugar Experiment Station, Mackay	10·31	29	7·68	3·89
Kilkivan	4·88	47	6·17		Warren	3·93	12	4·81	0·80
Maryborough ...	6·41	54	6·13	0·53					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for February, 1927, and for the same period of 1926, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Meteorologist.

CANE GROWERS' CONFERENCE.

FIRST ANNUAL GATHERING AT MACKAY.

OPENING ADDRESS BY THE ACTING PREMIER.

PARLIAMENT OF THE SUGAR INDUSTRY—THE WORLD'S SUGAR POSITION—SURPLUS PRODUCTION—EMBARGO RENEWAL—UTILISATION OF BY-PRODUCTS—ASSIGNMENTS FOR CANE CULTIVATION.

"In the course of the past year further important advances have been made in the Government policy of agricultural organisation. The Primary Producers' Organisation and Marketing Act is a culmination of the desire of the Government to see rural activities established on a sound basis. . . . That Act has placed the organisation of Agriculture on a purely commodity basis, with each branch of the industry in possession of purely local autonomy.

"The stability of the sugar industry is founded entirely on the securing of a renewal of the embargo against the importation of sugar grown by coloured labour overseas. For this reason, whatever the decisions of the conference may be, I hope that there will be no diminution on the part of the producers of that unity of purpose by which the industry as a whole has benefited."

—Mr. W. Forgan Smith,
Acting Premier and Minister for Agriculture and Stock.

The first annual Cane Growers' Conference convened by the Queensland Cane Growers' Council commenced in the Town Hall, Mackay, at 10 a.m. on Wednesday 23rd March, 1927. Delegates from each mill in Queensland were in attendance, and Mr. George Johnson (Chairman of the Cane Growers' Council) occupied the chair. Mr. Johnson briefly welcomed the delegates and expressed his appreciation of the presence of the Acting Premier (Mr. W. Forgan Smith). He had much pleasure in calling on Mr. Forgan Smith to officially open the Conference.

SPEECH BY MR. FORGAN SMITH.

Mr. Smith, who was received with applause, said that it afforded him much pleasure to be there that morning to officiate at the opening of the first Conference of cane growers convened by the Queensland Cane Growers' Council under the provisions of the Primary Producers' Organisation and Marketing Act, which was placed on the statute-book during the last session of Parliament. It would be remembered that the Conference held in Mackay in January of last year had been convened by him as President of the Council of Agriculture under the old Primary Producers' Organisation Acts. In the course of the past year, further important advances had been made in the Government policy of agricultural organisation. The Primary Producers' Organisation and Marketing Act was the culminating factor of the Government's desire to see rural activities established on a sound basis, so that the countryside, as rural society, may enjoy the opportunities and amenities which are the moral right of a nation's citizens. That Act had placed the organisation of agriculture on a purely commodity basis with each industry having purely local autonomy; in other words, each section of farmers had complete control of its own industry. The Council of Agriculture under the new Act was composed of representatives elected by the various commodity or pool boards, and was the executive body to deal with matters of general concern to the producers. He felt satisfied that the new form of organisation would accomplish good work.

The Northern Cyclone and Floods.

Continuing, the Acting Premier said that he desired to express his personal sympathy—and also that of the Government—with those who suffered bereavement and other material losses during the recent cyclone and the floods that followed in its train in the North. Unfortunately, those within the tropical zone were subject to those visitations, and it was only when one had the unhappy experience of the results which attend such disturbances could the distress and loss which were left in their path be realised. He remembered the sufferings which many went through in the Mackay district in 1918, when this district had one of these disturbances, and it was with personal knowledge that his sympathy was extended to those who had suffered in the recent cyclone in the Far North.. The repetition of storms and hurricanes, followed as they generally are by serious floods, is the worst enemy of the North; and unfortunately it is a form of destructiveness which admits of little safeguard. With the knowledge of the privations and loss which are occasioned in such times, one cannot but be struck with admiration for the fortitude and courage with which people meet these situations—a characteristic typical of the Australian people. "The reinstatement of the sufferers is a duty which is national in its appeal," said Mr. Smith, "and I am pleased that the efforts that are being made in this respect are meeting with a good response. The Government has given consideration to the question of assisting those whose farms and property suffered to enable them to re-condition and rehabilitate, and I am in touch with the associated banks and other financial institutions on this subject. It is needless, I think, for me to say that the Government is sympathetic, and I am hopeful that, with the collaboration of the associated banks, ways and means will be devised to meet the difficulties in this respect."

Annual Parliament of Sugar Industry.

Proceeding, Mr. Smith said that the present Conference could be described as the Annual Parliament of the Sugar Industry, attended, as it was, by delegates from all the mill areas in Queensland to deal with matters affecting their interests. The history of the industry over the past decade was very interesting, and indicated some very important developments. The principle of collectivism had been endorsed; and that policy, he thought, stood to-day. The industry at the present time was faced with certain very important and vital problems. The question of the best method of dealing with over-production had been agitating the minds of those in the industry, but owing to the drought conditions prevailing last year and the recent disastrous cyclonic disturbance in the North, it was likely that the problem would not be so acute this year.

Review of World's Sugar Position.

In addition, a recent review of the world's sugar position indicated that "the estimates for the coming year show a marked decrease in the world's sugar production for the first time in several years, the estimated decrease amounting to 1,167,810 tons." The same review also makes the following comments:—"On the other hand the consumption of sugar during the past year has shown healthy increases in all sections. In the United States, the largest sugar-consuming country in the world, the increase is estimated at approximately 250,000 tons, which is slightly above 4 per cent. over the previous year. In Europe also the consumption is increasing gradually. With the marked increase in consumption in the principal sugar-consuming countries of the world and the large decrease in the estimate of the coming crop, together with the fact that stocks during the year have been gradually decreasing until at the close of the year they are approximately on a normal basis in relation to the demands of the world, prospects for the coming year are markedly improved, with prices at the close of this year showing a stability and tendency to rise. A more even balance between production and consumption as now in view will result in a stabilisation of the sugar industry and produce returns which should be remunerative to all engaged in the industry.

Over-Production—The Importance of Retaining a United Front.

Referring to the matter of over-production, Mr. Smith said that various schemes had been suggested as a means of dealing with this question in Australia, but it was not his province to refer to the merits or demerits of those schemes at that juncture. Suffice it to say that whatever might be the decisions of the Conference, it was most essential that delegates should keep the important principle in view that the interests of the whole were always greater than those of the unit, and that which was for the benefit of all must in the last analysis be for the benefit of the individual. By means of organisation in the past, and by means of the various enactments of the State and the Commonwealth Governments, they had been enabled

to present a united front and state a united policy for the benefit of the industry as a whole. The necessity for the preservation of that unity was never more important than at the present time. A brief retrospect of the industry over the past decade indicated the progress that had been made since the passage of the Sugar Acquisition Act in 1915, under which the Queensland Government acquired the whole of the output of raw sugar at a fixed price, and also since the subsequent agreements between the Commonwealth and State Governments, culminating with the existing embargo against the importation of sugar grown by coloured labour overseas.

Renewal of the Embargo.

"The tenure of the existing embargo expires in August, 1928, but the harvesting of the coming season's crop will be the last to be affected by it," the Acting Premier continued, "consequently the importance of preserving that unity which had characterised the industry during the past ten years cannot be over-estimated. The stability of the industry is founded entirely on the securing of a renewal of the embargo, and for this reason, whatever might be the decisions of the Conference. I hope that there will be no diminution on the part of the producers of that unity of purpose by which the industry as a whole has benefited. A complement to the renewal of the embargo is the question of efficiency in the industry, both in the field and in the mill. No doubt, due largely to the work of the Sugar Experimental Stations and to other activities, much had been accomplished in that direction, as was evidenced by the fact that for 1925, on the average, 7.55 tons of cane were required to make one ton of sugar as compared with 8.51 tons of cane, on the average, for the same purpose in 1914. But it is important that there should be no relaxation of the efforts that have already been made. The granting of any embargo carries with it an obligation on the part of the producers and those engaged in an industry to supply a product to the requirements of the people of Australia, subject, of course, to a reasonable standard of efficiency, and in this connection it is necessary to exhaust every effort to secure those standards of efficiency which will obtain the greatest results from the utilisation of the by-products."

UTILISATION OF BY-PRODUCTS.

Power Alcohol.

Dealing with the manufacture of power alcohol, Mr. Smith said that the inauguration of the first distillery for the manufacture of power alcohol in Australia, which took place at Sarina on 17th February last, marked an important epoch in the history of the Australian sugar industry. At the present time Australia was practically dependent on outside resources for her supplies of lighter oils for use in internal combustion engines. There was no question but that the internal combustion engines had come to stay. Modern engineering skill had brought those engines to such a state of perfection that their reliability was now never doubted. We saw increasing uses for them in transport, tractors for cultivation, pumps for irrigation, and use in almost every phase of modern civilisation and industry. Four years ago importations of petrol into the Commonwealth amounted to between 35,000,000 and 40,000,000 gallons. Two years ago there were 80,000,000 gallons, and this year there will be over 100,000,000 gallons, of petrol imported into the Commonwealth.

Although Australia was, so far as was known, deficient in natural oil fuels, she had the advantage over many other countries in possessing the necessary elements for the production of raw materials which could be used for the manufacture of alcohol. The Sarina distillery would utilise what in the past has been to a large extent a waste product—namely, molasses supplemented by cassava.

The entire molasses yield from the 1925-26 crop would produce not more than 7,200,000 gallons of 95 per cent. alcohol, or about 8 per cent. of present total requirements. The new industry at Sarina would be the first in the world to supply alcohol fuel in large quantities entirely for motor purposes, and he understood that it was the company's intention to produce 1,000,000 gallons per annum. These figures indicated the wide field offering for the development of the manufacture of industrial or power alcohol. If the Plane Creek experiment were successful, he understood that the company proposed establishing other distilleries in Queensland in the near future, so that it would be possible from now on to eliminate the waste that had hitherto taken place with regard to our molasses, and to give this by-product of the sugar industry a definite commercial value. In addition it would enable us to divert to Australian producers and workmen a proportion of the very large amount that is annually paid to foreign oil companies. "It is not difficult to visualise the immense opening for these activities in assisting to supply the home market with one of the prime necessities of industry and transport," added the Acting Premier, "and there is also the importance as a national question of being independent of outside sources for our supplies in this respect."

By-Products of Megass.

Proceeding, Mr. Smith said that the steps that were contemplated to utilise the crushed fibre of the sugar-cane in supplying Australia's shortage of soft woods was also another expression of the desire to eliminate waste in the industry, and the fact that in 1925 this State imported 12,000,000 feet of foreign softwoods to meet its requirements was an indication of the possibilities in this regard. These new manufactures arising out of the sugar industry, national as they were in their aspects, were such as to the more forcibly indicate the claims that the basic industry —that of canegrowing—was a national one. At the present time no other agricultural industry in Australia employed so much manual labour, and as its allied manufacturing enterprises were naturally developed, there would be an immense increase, not only in the number of men employed, but also in the consumption of those commodities produced by the secondary industries of the South. These developments were of much interest to canegrowers, as they certainly tended to stabilise the prime industry—canegrowing—as the basis of such productions.

Assignments.

Referring to the question of assignments of cane lands generally, Mr. Smith said that that matter had recently received a good deal of consideration by the Central Sugar Cane Prices Board. Up to and including 1917, local boards were constituted in each year since the inception of the Act. In the notice of constitution all lands owned by canegrowers who were supplying cane to a particular mill in each of the years 1915 and 1916 were assigned to that mill. The notice covers land owned by such growers not necessarily under cultivation for cane; the land may even be now in its virgin state. In view of this and other anomalies the Board had decided to send an officer into each district who, in collaboration with the millowner and the grower concerned, would collect information which would enable it to determine the area for which each grower was entitled to assignment. It was hoped that this investigation would be the means of dealing equitably with a question which has caused considerable anxiety to many canegrowers.

Conclusion.

In conclusion, the Acting Premier said that it was not his purpose to go through the various items on the agenda paper, nor at that stage to express an opinion. He took it that delegates would deal with such matters, and that subsequently the recommendations of the Conference would be submitted to the Government for consideration. As Minister for Agriculture, and as President of the Council of Agriculture, and on behalf of the Queensland Cane Growers' Council, he welcomed them sincerely to the Conference, and expressed the hope that their deliberations would be a great success. He trusted that their decisions would result in increased prosperity and benefit to the industry as a whole, and he had much pleasure in declaring the Conference officially opened.

BIRD SCARES.

The Manager of the Home Hill State Farm, Mr. C. G. Munro, writes:—Two different bird scares were tried here recently. The first was a kerosene tin slung by a piece of No. 8 fencing wire through the ends. On the outside of the tin oblong pieces of tin 12 in. by 6 in. were soldered from corner to corner diagonally, on each of the four sides. A vane 14 in. by 6 in. was fastened above the tin on the wires that connected with the central shaft through the centre. The lower end of this vane was placed sufficiently high to allow the tin and its sails to revolve beneath the vane by wind pressure; a few light pieces of wood put inside the tin caused suffient noise to attract notice. This contraption was suspended from the end of a long sapling set in the soil with a good lean and strutted by two forks to keep its base sufficiently firm to withstand windage on the revolving "scare." Parrots and cockies gave this thing a wide berth.

Another device, also composed of kerosene tin, was fitted with two tin wings from its corners and a tail to keep it in the wind. This suspended from a leaning sapling also frightened the birds, who probably mistook it for a new kind of hawk. The frequent flashes of reflected sunlight from the moving and plunging scare made even the crows look upon it with black suspicion. Whether that frame of mind will continue remains to be proved on future crops.

OBITUARY.

COLONEL THE HON. A. J. THYNNE.

END OF A DISTINGUISHED PUBLIC CAREER.

A notable and busy life was ended on Sunday, 27th February, with the death, at his residence, Highgate Hill, Brisbane, of Colonel the Hon. Andrew Joseph Thynne, at the age of seventy-nine years. For more than half a century he had been connected with the legal, educational, political, and social life of the State. Sometime Minister for Agriculture and Stock, he influenced largely the progress of the primary industries in Queensland. Despite the burden of years he continued to manifest interest in public affairs, as Chancellor of the University of Queensland and otherwise, almost to the last.

Plate 66.—The Late Colonel the Hon, A. J. Thynne.

He was one of those who, in Carlylean phrase, cannot but be in earnest; whom nature herself has appointed to be sincere.

A Man of Action.

Irish by birth, and a true Queenslander, in that he was at all times in his long and useful life actuated by the most thorough regard for the well-being of this State and the advancement of its people, the late Colonel Andrew Joseph Thynne was undoubtedly one of the "grand old men" of law and politics in this country. Always a cultured and considerate gentleman, his innate qualities of dignity, kindness, and candour won him the affection of his many friends and the respect of the community he served so well. In no sense of the term was he a man of words. He invariably preferred action—action, wherever possible, of the most unostentatious kind.

Early Days.

The late Colonel Thynne was born at Ballinagrave House, County Clare, Ireland, on 30th October, 1847, and was the son of the late Edward Thynne. He received the foundation of his education in his home county, chiefly at the Christian Brothers' School at Ennistymon, and at the hands of a private tutor. Later, he attended Queen's College, Galway, where he carried off a classical scholarship. He arrived in Queensland with his parents as a young man in 1864, and obtained a position in the civil service as a clerk. The prospects as an employee of the Government did not, however, accord with his ambitions, and he resigned after a little while in order to take up the study of law, securing admission in 1873 as a solicitor. In 1882 he was appointed to the Legislative Council, and such was his ability as a legislator that he was repeatedly chosen for Ministerial honours. He was Minister for Justice and Attorney-General in the McIlwraith and Morehead Ministries of 1888 and 1890, and was a Minister without portfolio in the McIlwraith-Nelson Government of 1893. Under the Premiership of Sir Hugh Nelson, he was made Postmaster-General, and occupied that important post from 1894 until 1897. He was also Secretary for Agriculture from 1896 until 1898. Prior to his becoming Minister for Agriculture, the portfolios of Lands and Agriculture had been combined.

The first Minister for Lands and Agriculture was the late Mr. Henry Jordan, who was appointed on the 30th August, 1887. He was succeeded as Minister for Lands and Agriculture by Mr. C. B. Dutton, Mr. M. Hume Black, Mr. A. S. Cowley, and then Mr. A. H. Barlow, who was Mr. Thynne's immediate predecessor. He held office from the 6th May, 1896, to the 2nd March, 1898.

Founder of the "Queensland Agricultural Journal."

To Mr. Thynne may be given the credit of organising the Department of Agriculture and Stock, and for the immediate establishment of many of the present activities of the Department, including the creation of the Agricultural College, State Farms, the "Queensland Agricultural Journal," and the institution of Agricultural Conferences on a State basis. He also had passed the first Diseases in Stock Act and the first Diseases in Plants Act. The two travelling dairies were started prior to Mr. Thynne's term of office. They were really instituted by Mr. Black in 1889, Mr. Baron Jones being the manager of No. 1, and Mr. John Mahon the manager of No. 2.

Queensland was represented by him at a number of momentous conferences, notably the Federation Conference at Sydney in 1891, the Colonial Conference in Canada in 1894, the Postal Conference at Hobart in 1895, and the Pacific Cable Conferences of 1895-6.

Influence on Education.

A consistent advocate for better and increased educational facilities for the people, Colonel Thynne ranged himself on the side of those who were agitating for a Queensland University. He recognised, as did other thoughtful men in the community, that such an institution was necessary to the State if its citizens were to be fitted for leadership, and, accordingly, he did his best to influence public and official opinion in this direction. It was a fitting tribute both to his services and his qualifications that he should have been appointed to the first University Senate, in April, 1910. When the second Senate was elected in 1916, he was elected Vice-Chancellor, and was re-elected to that position year after year until 1926, when he became Chancellor. He gave to the post the fruits of his long experience of men and affairs, his culture, and his love for work, and it is no exaggeration to say that he has left an indelible impression upon the institution. He did not, however, confine himself to academical affairs. His energy and public spirit found an additional outlet, at various times, as president of the Queensland Ambulance Brigade, president of the Boy Scouts' Association, president of the Chamber of

Agriculture, president of the Law Association, and chairman of the Board of Technical Education.

The late Colonel Thynne ardently advocated a sound mind in a sound body. Hence his fondness for combining healthy outdoor life with mental training. He first became associated with the military forces as far back as 1867, and on two occasions won the Queen's prize at rifle matches, thereby proving himself an uncommonly good shot. Rifle shooting was one of his chief recreations, but he also exercised himself as quietly with bowls, as well as busying himself with gardening pursuits. His mind he constantly cultivated, and he did all he could to broaden the mental outlook.

His patriotism found a special outlet when he became chairman of the Recruiting Committee, in which capacity he did such untiring, good work.

In his time, therefore, the late Colonel Thynne was a fine lawyer, a far-sighted politician, an ardent educationalist, a firm patriot, a loyal soldier, and, above all, a good citizen. He will long be remembered for his unselfish services to Queensland, and his many lovable personal qualities will ever be cherished by those who were proud to acknowledge him as a friend.

A Record of Great Public Service.

"As a citizen the late Mr. Thynne measured up to the highest standard. Beginning life without the prestige of wealth or great influence, he rose steadily in his profession and in the esteem of his fellow-men. In him were united keen intellect and dignified bearing that enabled him to adorn whatever he touched."

In those words His Grace, the Right Rev. Dr. Duhig, Archbishop of Brisbane, in the course of an eloquent panegyric at the solemn requiem mass in St. Stephen's Cathedral on the following day, and which preceded the State funeral, epitomised the public-spirited career of a great Queenslander, whose death was made the occasion of public mourning.

At the funeral wide-spread sorrow for the passing of a great citizen was manifested during the passage of the cortege from the cathedral through the streets of the city to the South Brisbane Cemetery, where the scene was a most impressive one. There were gathered representatives of every section of the community, including His Excellency the Lieutenant-Governor, Hon. William Lennon; the Premier, Hon. W. McCormack; the Deputy Premier and Minister for Agriculture and Stock, Hon. W. Forgan Smith; the Attorney-General, Hon. J. Mullan; the Minister for Public Instruction, Hon. T. Wilson; and the Minister for Public Works, Hon. M. J. Kirwan, and the Chief Justice, Hon. J. Blair. The Speaker and Members of the Legislature, the Vice-Chancellor and Senate and Faculties of the Queensland University, the Judiciary, State and Federal Public Services, Naval and Military Forces, Foreign Consular bodies, City Council, Public bodies and National societies, Professions and Commerce, and the University Union were all specially represented.

After the recitation of the burial service by His Grace Archbishop Duhig, the Vice-Chancellor of the University Senate (Dr. W. N. Robertson) said that they had gathered to pay their last respects to a great man. The University of Queensland owed a great deal to him. He had done great work for all its departments, but they were particularly grateful to him for his great work in the Department of Agriculture. His was also no small influence in the establishment of a Faculty of Agriculture within the Queensland University. Dr. Robertson said that it was not for him to discourse at any length on the merits of so great a man, whose accomplishments were patent to all. Colonel Thynne had been a shining example of service to the community, and a man of self-sacrifice. They could follow his great example, and their country would be a great one.

TRIBUTES.

Many tributes were paid to Mr. Thynne's life, character, worth, great public service, and lasting influence on the welfare of the State by representative citizens, of which the following were expressive of the general feeling of regret and sense of great public loss.

The Premier's Tribute.

"The death of Colonel Thynne," said Mr. McCormack, "removes a citizen who, as well as being a leader in his own profession, was for a very long period closely associated with the government of this State.

"Latterly his public life was, in the main, devoted to the Queensland University, with which institution he had associated himself from its foundation, and in the advancement of that institution, and of education generally, he took an extraordinary interest.

"The Queensland Ambulance service also owes a great deal of its splendid tradition and efficiency to the untiring zeal and devotion to duty of Colonel Thynne.

"In view of his distinguished career as a citizen of this State, and his splendid service as a public man, the Government considers it fitting that his remains should be accorded a State funeral."

Tribute from the Acting Premier.

A high tribute of appreciation was paid to the memory of the late Colonel Thynne, a former Minister for Agriculture, by the Acting Premier and present Minister for Agriculture and Stock (Hon. W. Forgan Smith).

Mr. Forgan Smith said that he had read with regret of the passing of Colonel A. J. Thynne, who was, without doubt, one of Queensland's great citizens. In his long public career he had been associated with many activities which were calculated to promote the progress of the State. A former Minister for Agriculture in this State, he laid down the basis of an organisation which had been built upon as the State developed. The late Mr. Thynne had set out in a very clear and concise manner what he considered should be the functions of a State Department of Agriculture, and when he (Mr. Forgan Smith) took charge of the department he had read that document with great interest.

Mr. Forgan Smith added that he had been associated with Colonel Thynne on the State Executive of the Queensland Ambulance Transport Brigade, of which Colonel Thynne had been president since its inception. His work in setting up that body was a great success, and the benefits which the organisation had conferred on Queensland owed much to his untiring energy and organising ability. His work in the sphere of education and in the development of a better and more adequate system within the State had also borne fruit, and his appointment as Chancellor of the University of Queensland was a fitting recognition of the services he had rendered that cause.

The Chief Justice's Tribute.

The Chief Justice (Hon. J. W. Blair) paid a glowing tribute to the memory of the late Colonel Thynne in the Supreme Court. "I have learned," he said, "with the deepest regret of the passing of Colonel Thynne. The deceased was a solicitor of this Court of long and honourable standing, a citizen with a career of long and distinguished service to the State, a Cabinet Minister, a Minister of Justice, and the head of our profession. We shall miss him, and my brothers and I tender the deepest sympathy to his widow and family."

'POSSUM POISONING—MENACE TO STOCK OWNERS.

According to the Southern Press, serious complaints concerning the poisoning of valuable stock by preparations left in places accessible to sheep and cattle for the purpose of illegally poisoning opossums are being made by pastoralists and farmers who lately have suffered severely from losses arising from this cause. For some time, it is reported, it has been the practice of unscrupulous persons to lay poisoned baits for opossums on farm and pastoral properties, a method of destruction prohibited by law. The hunting of opossums in the usual manner is permitted only under strict conditions, but by reason of the high prices which can be obtained for skins many persons without licenses, it is said, have lately adopted the practice of poisoning. The dead opossums are recovered by trappers, and according to country residents, are disposed of to buyers visiting rural districts in motor-cars under cover of darkness. It is believed that these buyers are able to dispose of the skins and evade detection by the authorities by concealing the skins in bundles of rabbit skins. Baits lying upon the ground which are not taken by opossums are picked up by sheep and cattle and in some districts heavy losses of stock which have eaten the baits have been reported from time to time. Farmers say that although heavy penalties have been provided for infringements of the law they are far from satisfied with its administration, and consider that more effective steps should be taken to prevent what constitutes not only a defiance of the regulations, but a serious menace to stock owners.

BREEDS OF PIGS.

E. J. SHELTON, H.D.A., Instructor in Pig Raising.

THE MIDDLE YORKSHIRE

(also referred to as the Middle White).

There are several breeds of pigs suited to the climatic conditions and environment of Queensland—the Berkshire, the Tamworth, the Poland-China, the Middle Yorkshire, and the more recently introduced types, the Duroc-Jersey, the Gloucester Old Spot, and the Large Black.

There are also, of course, several crossbred types obtained as a result of mating two of these pure breeds together, such as the Tamworth and the Berkshire.

To the young farmer who sets out with the idea of securing foundation stock for his future herd, several important points must therefore be kept in mind. Some of these might be dealt with as follows:—

First, he must consider his own fancy, for most men interested in pig-breeding have a fancy for one breed or another.

Secondly, consideration must be given to the public taste. This is a very important point, as the public represent the buyers, and in order to secure top market rates we must aim at giving the buyer exactly what he requires.

Thirdly, he should not forget the live stock market demands. Some markets call for one type, some for another. The markets of the South call for a much heavier supply of light and medium weight porkers than the Queensland markets. Their types differ, too; thus in Victoria the most popular types are the Berkshire and the Large and Middle Yorkshires, or a cross between these breeds. These types being admirably adapted for the production of pork pigs and for the comparatively light bacon pigs, for which there is nowadays such a persistent demand, they suit the Southern markets rather better than the North. It is for this reason that types like the Berkshire, Tamworth, Poland-China, and Duroc-Jersey are more popular in Queensland than the famous Old Yorkshire, of which breed we have but one type in Queensland now, popularly known as the Middle White or the Middle Yorkshire. The Gloucester Old Spot is becoming more popular every year, and doubtless the Large Black will also find a place in the market as time goes on.

Origin of the Middle Yorkshire.

As far back as the year 1852, Joseph Tuley, a noted breeder of his day, exhibited at the English live stock shows a number of excellent quality white pigs. These were called Large Yorkshires, and were much admired. It was found that they were not altogether satisfactory, however, for they were inclined to grow too large, and were, as a result, very coarse; so eventually a smaller type became more popular, and these were known as Small Yorkshires. These, after a wonderful run of popularity, also failed to "fill the bill," and thus it came about that as a result of continued crossing and careful selection another type was fixed, to which the title of Middle Yorkshires, Middle Whites, or Mid-Yorks was given. These have now, particularly in Australia, outgrown both the others in point of popularity with both pork-buyers and bacon-curers. Tuley was in reality one of the founders of this type, and he spent many years striving to make his favourites more perfect, both from a show as well as from a utility standpoint. Thus we have in the Middle York the medium between the short chubby nose and body of the Small Yorkshire and the rather elongated fine snout of the larger type. The short, broad face and the general symmetrical appearance of this breed make them a very attractive as well as a very useful type.

It is usually considered that the short chubby type of pig is much earlier maturing than those carrying a longer, pointed, and less-dished snout, and a more lengthy, fleshy body. This is one of the reasons why the Middle Yorkshire is so very popular as a pork pig. In England the breeders still have the three distinct types of Yorkshires—the Large York (essentially a bacon pig, and for crossing for bacon production), the Middle York (a dual purpose animal suitable for either pork or bacon), and the Small York, which is distinctly a small, fancy trade porker suited only for Christmas or Easter markets. There are no Small Yorkshires in Australia; they are distinctly unsuitable for our climate, and we have no demand for the class they represent; they are also fast disappearing among British and Continental herds.

Of Large Yorkshires we have only a few, though this is a type for which there is a certain demand "down South." The Middle Yorkshire we have in limited numbers, and they are also a popular, attractive type, both in Great Britain and in

PLATE 67 (Fig. 1).—A FIRST PRIZE MIDDLE YORKSHIRE SOW WITH LITTER, SYDNEY SHOW.

Ralph Joyce's "Kyabram Beauty" 2465. The litter is sired by "Coleraine" 2234, who won the Progeny Group Prize, Royal Show, Melbourne, 1922. This litter was line-bred. The sow only had the seven pigs, but made an exceptionally good job rearing them. The small black stain on the backs of the suckers are sale (paint) marks only. An exceptionally well-developed lot. Typical rent-payers of an up-to-date type.

PLATE 68 (Fig. 2).

Three special qualifications to be noted in the selection of brood sows: Prolificacy, docility, and heavy milking capacity. They are all characteristics of the Middle Yorkshire Sow in this picture.

other countries. In the United States of America the Mid York is classed as a secondary breed; they do not suit their conditions as well as some of their own white breeds, the Chester White, the Victorias, &c. They have therefore not been taken up very much by our "Yankee" friends, who prefer a "Made in America" breed.

One of the English writers (Harris, on the Pig) says of the Middle Yorks:—"They are perhaps the most useful and most popular of all the white breeds, as they unite in a striking degree the good qualities of the Large and the Small Yorkshires, and fortunately do not possess many of the inferior qualities of either of its progenitors.

"As a bacon pig, the type under review is well developed, and the lengthy sides enable it to produce more lean meat or meat of a 'streaky' nature. For the production of an ideal bacon pig they should be crossed with one of the other breeds, a large breed for preference (this for the English market). For porkers the best results are obtained by mating the Middle Yorkshire sow with the Berkshire or Poland-China boar."

In the pure-bred state the Mid York makes a very useful porker, particularly if well cared for and kept in clean sties or yards well protected from the sun. They should be well washed and cleaned up before sent in to market if best prices are to be obtained. In the Southern markets they compare more than favourably with the Berkshires, &c. In general they resemble the Berkshire very much; they vie with the latter breed for first place as a medium type, but must give way to the Poland-Chinas, Berkshires, and perhaps Duroc-Jerseys in districts subject to the extreme heat of summer, as the white pigs are more suited to the temperate parts of the State than to the tropical coastal districts. The Yorkshires cannot stand "sun baking," as their skin is ruined when once badly scalded or sunburnt. As an all-round farm pig for the cooler climates the Middle Yorks are a very fine type, noted for quick growth, early maturity, good feeding qualities, even proportion of fat and lean, with a comparatively light percentage of offal when slaughtered.

Several points worth careful note emphasised by British breeders are as follows:—

(1) They are of a size, shape, and flesh that are desirable for the pork-buyer or bacon-curer's use.

(2) They have a hardy, vigorous constitution and a good coat of hair (if special attention is given to selecting a suitable type), which protects the skin.

(3) They have been spoken of as the gentlest race of pigs in existence, easily handled at all times, and kept in bounds with ordinary fences. They are also quiet and contented.

(4) They feed well and fatten quickly at any age.

(5) They are very prolific. Generally speaking, they are the most prolific and prepotent type we have. The young pigs are mostly even in colour and vary but little in shape. They are true to type and their form, when matured, may be determined by inspecting the sire and dam. They are considerably more prolific than the Small Yorks. Like all white types, they occasionally show blue or very dark spots on their pinkish skin.

Both pork-buyer and bacon-curer agree that the "Yorks," when well fed and cared for, produce a large amount of tasty, nutritious flesh with a minimum of light bone and offal. The flesh is evenly distributed; the sum of good qualities is higher than in most breeds. There is fully 10 per cent. or more difference in the meat value of a good well-developed Yorkshire as against the common or mongrel pig, of which, unfortunately, we still have a percentage. The latter types are usually deficient in vigour, constitution, and quality of flesh, whilst they are characteristically always hungry and squealing for more food.

Special Attention in Selecting Middle Yorkshires.

Special attention should be given in selecting boars and sows of this type in Queensland to ensure securing animals well provided with a thick coat of fine, silky hair, free from coarseness and black hairs. The very soft-skinned light-haired types are quite unsuitable here. See also that they come from types noted for prolificacy. The Yorkshire sow is noted as an excellent mother, giving a good flow of rich milk.

In the Mid York the ham should be more fully developed than in most breeds. It has a great length at the rump, and the tail is usually well set up; the lengthy back, which may be slightly arched, carries a good depth of flesh, and this, connecting with the ham by a strong thick loin, induces a strong development of flesh in this most valuable cut.

PLATE 69 (Fig. 3).—A BONNY LITTER JUST READY FOR WEANING.

A Prize-winning Litter at Sydney Show, exhibited by the owner, Mr. M. Marshall. Herdsman for Mr. Ralph Joyce, of Kyabram, Victoria. These pigs were sired by the champion boar, "Drayton's Chief," and were from that well-known prize-winning sow "Leona."

Pigs of this quality are not difficult to handle for they have become accustomed to other food in addition to the mother's milk before weaning. Note their even development, splendid quality, and rapid growth. The Middle Yorkshire is noted for prolificacy, docility, and

Other Characteristics.

The shoulders should be well set, deep and wide, allowing for the development of a roomy capacious chest, which is a very necessary feature. The neck should taper slightly towards the head. This is particularly noticeable in the female. The jowl is light, running well into the neck. The Yorks do not carry the heavy jowl and short thick neck characteristic of some types of the Poland-China. The snout is short and dished, the muzzle broad and full, ears inclined to be large, though some types have short pricked ears. In the Middle Yorks the legs are usually well developed. This is a weakness in many strains of the larger type. The belly and flanks are deep and full fleshed, and the udders well developed. The sows are prolific, litters ranging from nine to thirteen being by no means uncommon. The "York" boar is usually a very sure stock-getter, and is both active and prepotent.

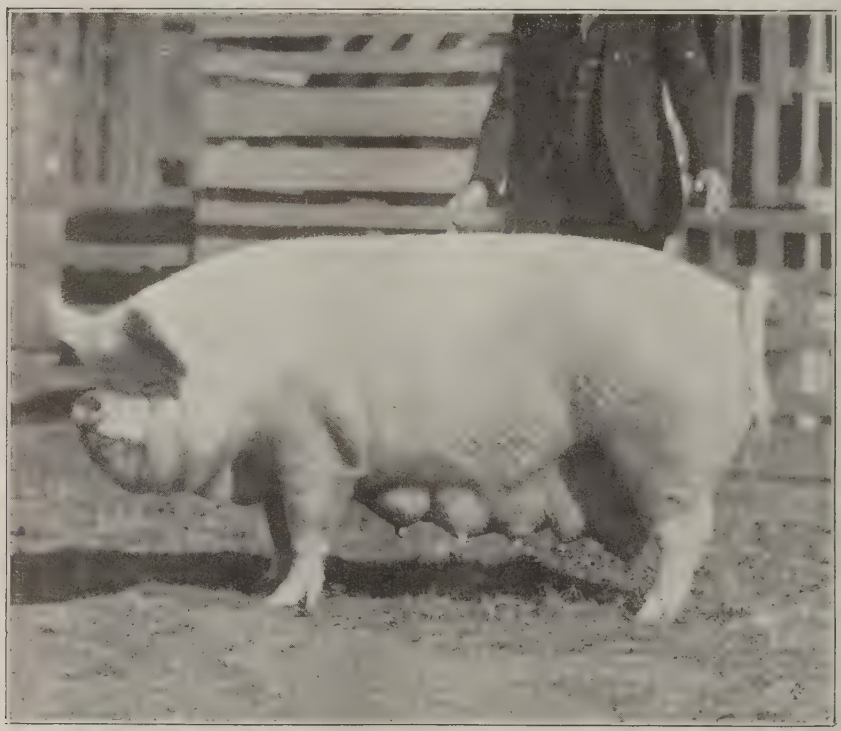

PLATE 70 (Fig. 4).—THE RESERVE CHAMPION MIDDLE YORKSHIRE SOW AT THE ROYAL AGRICULTURAL SHOW, MELBOURNE, VICTORIA, SEPTEMBER, 1926. MR. J. H. THORBURN'S "OATLANDS ENID," 2740.

A typical representative of the Middle Yorkshire breed. A sow capable of rearing large, thrifty, early-maturing pigs. Note the wonderful development of udder and teats, indicating the capacity to produce large quantities of milk.

The Yorkshire's Greatest Fault.

Unfortunately, the Yorkshire pigs possess the one great fault—they cannot stand the rougher conditions characteristic of many of our pig farms. They sun scald badly, and do not present the attractive appearance of other types that do not suffer so much from this defect. There is but one way to overcome this fault; the utmost care should be given in the first instance to selecting thick-haired types, and to providing abundant shade and shelter for the pigs at all times. Given these conditions, with improved methods of feeding and handling, there is no reason why the York should not prove a satisfactory type.

Breeders of this Type.

The late Mr. W. J. Warburton, who for many years prior to his death was a breeder and fancier of the Middle Yorkshire, his experience of them being that they were equal to the best in all other breeds if given anything like a decent chance, while they were superior to the general average farm pig from the standpoint of the pork and bacon producer. His famous Northgate stud (now, unfortunately, entirely dispersed) had a splendid reputation for the quality of its White pigs—the stud was represented by liberal entries at Sydney and Brisbane shows for well nigh thirty years. In recent years, however, there has been a very considerable falling-off in the demand for stud pigs of the Yorkshire type, this particularly so in Queensland, hence breeders have reduced stocks or have disposed of their White studs, until at the present time there are but one or two registered breeders of these pigs with stock for sale.

Introductions of Middle Yorkshires during the past year or two include half a dozen very fine boars and sows donated to the Queensland Pig Club scheme by that well-known Victorian breeder, Mr. Ralph Joyce, who also supplied a yearling boar

Plate 71. (Fig 5).—A Typical Middle Yorkshire Sow

She won First Prize with litter at foot, Sydney Show. Property of Mr. J. Winterbottom, Mascot, New South Wales. Note her great depth and compactness. A young sow with a capacity to produce litters freely, regularly, and abundantly.

to the Colonial Sugar Refining Company's Macknade mill, in North Queensland, and a yearling boar donated to the Salvation Army Farm Home for Boys at Riverview, Queensland.

The Queensland Agricultural High School and College, Gatton (*i.e.*, the Gatton College) were for many years also breeders of Yorkshire pigs, but they dispersed their stud and do not now breed White pigs at all.

The Salvation Army Farm Home for Boys at Riverview have also recently introduced several breeding sows and one or two young boars of this old world type with the objective of establishing a Middle Yorkshire stud, and offering for sale selected boars and sows of varying ages. One young boar was recently sent North to the Atherton Tableland to Yungaburra, to an enthusiast there—Mr. P. C. McCarthy.

There are, of course, many farmers who have the Yorkshire strain in their herds, in fact one sees quite a number of White pigs as one travels. The bacon pig buyers do not appear to have any objection to these pigs, provided they are otherwise normal and free from sun scald or its effects. The White pigs referred to are mostly the progeny of Yorkshire boars from Berkshire or grade sows, or *vice versâ*, for, as stated above, there are very few pedigreed Middle Yorkshires in Queensland.

The following report is an extract from the publication "British Pigs for Profit," published by the National Pig Breeders' Association of England. It gives some interesting information in regard to this breed, as viewed from the standpoint of the British breeder and exhibitor:—

> "The popularity of the Middle White pig is due in no small measure to its value as a general purpose animal. It is one of the few breeds which can satisfy the requirements of both the pork butcher and the bacon-curer, and it enjoys equally with the Large White and Tamworth breeds all the advantages inherent to long registration. There is no doubt that part of the success of the breed has been due to its adoption by breeders who will ever rank as the pioneers of a sound pig-breeding policy and practice in England. It is safe to say that the uniformity in type which now prevails is not excelled by any other breed. Moreover, so long as the elimination of

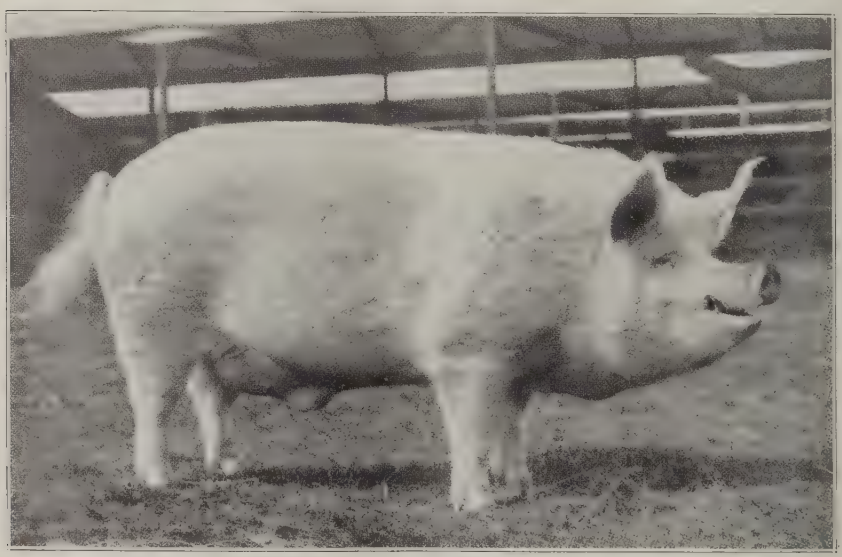

PLATE 72 (Fig. 6).—A TYPICAL LARGE WHITE BOAR OF THE LATEST ENGLISH TYPE.

Note his length, depth, and strength, the comparatively thick coat of fine silky hair, and the strength and boldness of character. Boars of this description are prepotent, active and vigorous withal, masculine in bearing and gait.

This photograph of a typical Large Yorkshire Boar is inserted to show the difference in type and conformation between the short-headed, thick-set Middle Yorkshire and the long-nosed, lengthy, deep-bodied Large Yorkshire.

> undesirable qualities is pursued with the judgment and energy exhibited by the owners of the leading herds, the Middle White pig is destined to enjoy a progressive prosperity.

"UNRIVALLED FOR PORK PRODUCTION.

> "Although the Middle White has been referred to as a pig that is suited to every requirement, it probably excels all breeds for the production of pork. The table of average weights, prepared after most careful investigation for the guidance of those who study the all-important question of weight-for-age, serves to indicate how rapidly the breed puts on flesh.

"It will be appreciated that when crossed to a Large White boar the progeny of a Middle White sow may be expected to grow to greater weights at the various ages quoted, because both practice and science has demonstrated that the first-cross pig excels in weight production.

"The successes of the Middle White pig at the London Smithfield Fat Stock Show indicate its ability to put on flesh. The champion single pig of the show in 1920 and 1922 was a pure-bred Middle White, the former scaling 367 lb. at eight and a-half months, representing a daily gain from birth of over 1½ lb."

Since then Middle Whites have won on several occasions in competition with other British herds. There can be no doubt but that the quality of the meat produced by Yorkshire pigs is good, while its ham is well developed and of excellent texture and flavour, the flesh carrying well down into the hock. No better description has been attached to any animal than has "the poor man's friend" to the Middle White. Every pound of food consumed is utilised to the best advantage, and the proportion of loss from live weight to dead weight is, according to the National Pig Breeders' Association's report, remarkably small.

Estimated Weights of Middle White Pigs at Varying Ages, as Published by the National Pig Breeders' Association of England.

Age.	Average weight.	Specially fed.
	lb.	lb.
8 weeks	30 ..	40
3 months	52 ..	65
4 „	78 ..	96
6 „	130 ..	150
7 „	158 ..	180
8 „	186 ..	210
9 „	216 ..	240
12 „	306 ..	330
18 „	466 ..	490
2 years	586 ..	620

Period.	Class.	Number of Animals in Class during Period.	Average Age.		Average Live Weight.	
			months.	days.	cwt.	lb.
1907-11 ..	Porkers not exceeding 100 lb. live weight	46	3	25	0	82
1902-11 ..	Not above nine months	120	8	14	2	83
	Above nine, not above twelve months	104	11	13	3	63
	Single pigs not above twelve months	28	11	1	3	53
1919-21 ..	Porkers not exceeding 100 lb. ..	30	4	2	0	92
	Not above six months	32	5	16	1	47
	Above six, not above nine months	47	8	15	2	49
	Single pigs not above nine months	15	8	13	2	40
1924	Two pigs under six months ..	28	0	183	1	92
	Two pigs under nine months ..	24	0	264	2	101
	Single pig, under nine months ..	13	0	265	3	7

Fecundity of the Breed.

Further extracts from "British Pigs for Profit" relate to the fecundity of the Middle Yorkshire breed:—

"The breed, like the Large White, is noted for prolificacy, and it is doubtful whether any other breed can surpass the Middle White in this direction. Without suggesting that it is necessary for a sow to have so many pigs in a litter, cases are frequently being reported of seventeen and eighteen being born, while twelve to fourteen is normal. The Middle White sow is a wonderfully docile mother and an exceptionally good milker; and these points are of vital importance to the feeder for the pork market.

"The fecundity of a sow must not only be judged by the number of pigs she produces, but also by the number which she rears. Time is lost—and time represents money—if a sow only produces a few pigs at farrowing time. Hence the Middle White, being naturally a prolific breeder, may be expected to yield more profit than most types.

"On one English farm where eighty breeding sows are kept and all records are accurately tabulated, the average number of pigs reared is no less than 22.4 per sow per annum—*i.e.*, 11.2 pigs twice a year. It may also be noted that one of the sows which produced seventeen pigs in a litter reared thirteen of them so satisfactorily that two were exhibited at several leading agricultural shows and obtained numerous prizes before attaining the age of six months.

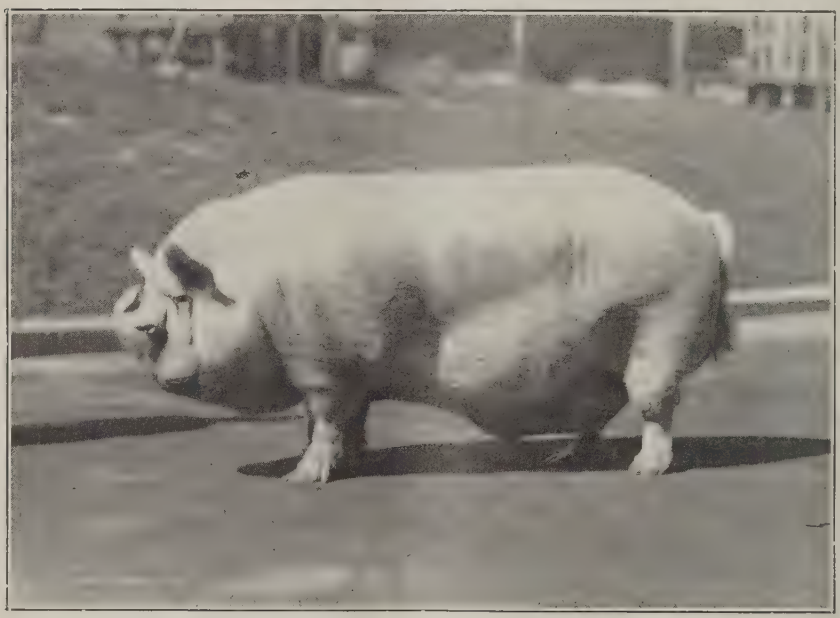

PLATE 73 (FIG. 7).—THE MIDDLE YORKSHIRE.

A popular type for the production of porkers and light bacon pigs. The Yorkshire Boar crossed with Berkshire Sows gives excellent results. Note this boar's conformation, type, and quality.

"THE HARDY AND THRIFTY PIG.

"Being of hardy disposition the Middle White is especially suitable to those farmers who have not elaborate sties, but who let their pigs 'roam wild.' Many breeders run their sows out by day, both in winter and summer. As a grazier, it is especially notable, and its confirmation, especially as revealed in comparative heart girth, indicates a good constitution.

"Throughout the cold, wet winters Middle White pigs may be seen running out in the fields. They have a natural disposition to put on flesh, and it is probable that this characteristic is one of the reasons why they have become so popular all over the world.

"The sound, vigorous constitution of the Middle Yorkshire is imparted to its progeny to a remarkable degree, no matter whether pure or crossed.

"Some of the principal objects which English breeders of Middle White pigs have had in mind since they established registration are to produce and improve animals which will thrive under all conditions, amass weight in return for a low consumption of food, produce and rear large litters, and, never forgetful of the commercial end of every pig, take the eye of the butcher at all stages of its life."

Standard of Excellence for Middle Yorkshire Pigs.

The Council of the Australian Stud Pig Breeders' Society have adopted the following:—

Colour—White, freedom from blue spots.
Hair—Long, plentiful, and silky.
Head—Short and light, wide between ears and eyes; face slightly dished.
Ears—Medium, carried erect; slightly inclined forward, fringed with fine hair.
Shoulders—Well sloped backwards and free from coarseness.
Chest—Wide and well let down.
Neck—Medium length, evenly set on shoulders; jowl full and not heavy.
Back—Long and straight; sides deep, ribs well sprung.
Loin—Broad and not drooping.
Belly—Full, thick, with at least twelve teats.
Flank—Thick and well let down.
Hams—Broad, full, and meaty to hocks.
Tail—Set on high, and not coarse.
Legs—Short, straight, and strong; feet firm and strong, hoofs nearly erect.
Action—Free, clean, and not rolling in hindquarters.

QUEENSLAND SHOW DATES.

The Queensland Chamber of Agricultural Societies has forwarded the following schedule of show dates for 1927:—

April.
Goondiwindi, 5th and 6th.
Beaudesert, 6th and 7th.
Dalby, 7th and 8th.
Chinchilla, 12th and 13th.
Sydney Royal, 11th to 20th.
Herberton, 18th and 19th.
Allora, 21st and 22nd.
Nanango, 21st and 22nd.
Kingaroy, 28th and 29th.
Oakey, 29th.

May.
Kalbar, 2nd.
Taroom, 2nd to 4th.
Charleville, 4th and 5th.
Wondai, 5th and 6th.
Toogoolawah, 6th and 7th.
Blackall, 10th to 12th.
Mitchell, 11th and 12th.
Boonah, 11th and 12th.
Murgon, 12th and 13th.
Roma, 17th and 18th.
Ipswich, 18th to 20th.
Kilkivan, 18th and 19th.
Springsure, 18th and 19th.
Wallumbilla, 24th to 26th.
Maryborough, 24th to 26th.
Emerald, 25th and 26th.
Buderim Mountain, 28th.
Childers, 28th to 31st.

June.
Marburg, 2nd and 3rd.
Gin Gin, 2nd to 4th.
Brookfield, 3rd.
Bundaberg, 8th to 10th.
Wowan, 8th and 9th.
Woombye, 15th and 16th.
Gladstone, 15th and 16th.
Lowood, 17th and 18th.
Rockhampton, 22nd to 25th.
Maleny, 23rd and 24th.
Wellington Point, 25th.
Gatton, 29th and 30th.
Kilcoy, 29th and 30th.
Biggenden, 30th June and 1st July.

July.
Townsville, 5th to 7th.
Woodford, 7th and 8th.
Caboolture, 14th and 15th.
Esk, 15th and 16th.
Charters Towers, 15th and 16th.
Ayr, 22nd and 23rd
Ithaca, 23rd.
Rosewood, 21st to 23rd.
Laidley, 27th and 28th.
Bowen, 27th and 28th.
Nambour, 27th and 28th.

August.
Redcliffe, 5th and 6th.
Royal National, 8th to 13th.
Crow's Nest, 24th and 25th.
Coorparoo, 27th.
Maroochydore, 27th.

September.
Imbil, 7th and 8th.
Gympie, 14th and 15th.
Beenleigh, 15th and 16th.
Stephens, 17th.
Pomona, 21st and 22nd.
Rocklea, 24th.
Nundah, 30th Sept. and 1st Oct.

October.
Kenilworth, 6th.

DAIRY FODDER PLOTS.

By A. E. GIBSON, Instructor in Agriculture, and C. S. CLYDESDALE, Assistant Instructor in Agriculture.

The subjoined notes have already appeared in the "Journal," and are reprinted in response to numerous requests from our readers in several districts in the State. They are of particular interest and value at the present time.—Ed.

The majority of farmers engaged in dairying do not appear to realise the advantages to be gained by the growing of crops to supplement pastures to tide their stock over the leaner months of the year.

With the object of introducing the system throughout the Northern, Central, and Southern coastal districts, where reliance is usually placed on Paspalum, Rhodes, and other grasses, certain crop trials were instituted by the Department of Agriculture and Stock to determine the best single crops or crop mixtures for the purpose, and to demonstrate also that the methods, as practised, are not out of reach or too elaborate for the dairy farmer to undertake.

In Southern Queensland the undermentioned farmers co-operated in carrying out trials with Dairy Fodder Plots during the past season:—A. Hulse, Yandina, North Coast line; F. C. Burton, Bridges, North Coast line; and J. B. Stephens, Nindooimbah Estate, Beaudesert.

The soil on Mr. Hulse's farm is a deep, alluvial type of dark-grey loam, fairly rich in humus, which has been under crop, principally maize, for several years. That on Mr. Burton's farm is a deep, light-red coloured, sandy loam, which has been under sugar-cane for a number of years, and, consequently, somewhat deficient in available plant food. Mr. Stephens's property is composed of rich, black, alluvial soil, situated on the banks of the Albert River, and is practically new ground, having produced only two crops, subsequent to which it was fallowed during the Summer months.

No fertilisers were used on this occasion on any of the plots.

The rainfall recorded at Yandina Railway Station, which is ¾ mile from Mr. Hulse's, and 3 miles from Mr. Burton's property, was—

Month.	Points.	No. of Wet Days.
March	1,059	9
April	1,110	10
May	357	5
June	716	11
July	643	6
August	183	1
September	172	5

The rainfall for Beaudesert was—

Month.	Points.	No. of Wet Days.
March	487	13
April	453	13
May	213	11
June	792	9
July	652	6
August	31	2
September	205	12

Cultivation.—At Yandina the land occupied by plots was ploughed late in February, to a depth of 8 in., immediately after the removal of a crop of maize (grain), but turned up in a very rough condition; and later on, in March, was cross-ploughed and, prior to planting, was reduced to a fine tilth by means of the disc-cultivator, followed by the harrows.

At Bridges the land was ploughed and harrowed in March, and cross-ploughed and harrowed in May; these operations resulted in an excellent seed-bed.

Plate 74.—Prince Wheat and Vetches at Mr. A. Hulse's Farm, Yandina.

Plate 75.—Prince Wheat and Vetches at Mr. F. E. Burton's Farm, Bridges, N. C. Line.

The plot at Nindooimbah was fallowed during the Summer, and before planting was again ploughed, thus making a perfect seed-bed.

Sowing.—The heavy rain experienced in March and April delayed planting operations. The soil was not dry enough to plant until 16th May, which, under the circumstances, was rather too late to expect early supplies of Winter fodder.

At all plots the usual local practice of broadcast sowing was followed, seed drills being unavailable. When used in mixtures, peas and vetches were sown first and "disced" in, the cereals being sown on the disced surface—once harrowed, and then rolled.

The majority of the plots made rapid progress, particularly the early-maturing varieties.

Description and Varieties on North Coast.—The two varieties of wheat experimented with—"Prince" and "Patriot"—appear to be suitable for the coastal districts, being practically free from rust, and made excellent growth. When harvested, they averaged 5 ft. in height.

Ruakura and Algerian oats suffered considerable damage owing to excessively wet weather, causing them to lodge, and to be badly affected by rust. They reached a height of 3 ft. at time of harvesting.

Skinless barley suffered badly from the effects of rust, which appeared when the crops were 2 ft. high, in the "shot blade" stage.

Cape barley did fairly well, and when harvested averaged 4 ft. in height, producing a large amount of foliage, and showing only slight indications of rust.

Rye made quick growth, looked remarkably well throughout the growing season, and, when harvested, averaged 5 ft. in height.

In all plots the field peas did remarkably well, making vigorous growth throughout, and, when harvested, averaged 4 ft. 6 in. in height.

Vetches, which are usually rather slow in growth, produced a fair amount of foliage, and, when harvested, averaged 4 ft. in height.

Plots at Nindooimbah.—Throughout the plots, peas and vetches were considerably overgrown by the other cereals used, thus affecting the subsequent yields of fodder. The varieties of wheat—"Prince" and "Patriot"—made excellent growth, stooling well, and having but slight indications of rust. Although they were knocked about considerably by wind and rain prior to harvesting, they did not suffer any serious damage.

Skinless and Cape Barley.—During the early stages of growth, these varieties suffered damage from excessive rains, which caused them to lodge; opportunity was taken to make a first cutting, this being effected ten weeks from the date when the young plants first appeared above the ground. A subsequent cutting was made at a later date, details of which appear in tabulated form. Cape Barley made most remarkable growth, but that of "skinless," subsequent to the first cutting, was somewhat thin.

Ruakura and Algerian Oats.—The former, being much the earlier of the two varieties, stooled well, and resulted in a much heavier growth. Later on, however, it showed an inclination to lodge, and to rust. The Algerian oats were somewhat later in maturing, but stooled well; this crop also showed an inclination to lodge, and a susceptibility to rust.

Rye.—Owing to its early-maturing habits and favourable conditions, the rye made rapid growth, and was harvested on 13th August, averaging 5 ft. in height at the time.

By using a little judgment in selecting the right varieties to grow, and getting the first sowing in, say, towards the end of March or April, a plentiful supply of green fodder should be available from early August until practically the end of October, by which time the Spring growth in pastures should be well advanced.

In all plots, each of which contained one-tenth of an acre—

Wheat was sown at the rate of 60 lb. per acre.
Barley was sown at the rate of 50 lb. per acre.
Oats was sown at the rate of 40 lb. per acre.
Rye was sown at the rate of 60 lb. per acre.
Field peas was sown at the rate of 30 lb. per acre.
Vetches was sown at the rate of 20 lb. per acre.

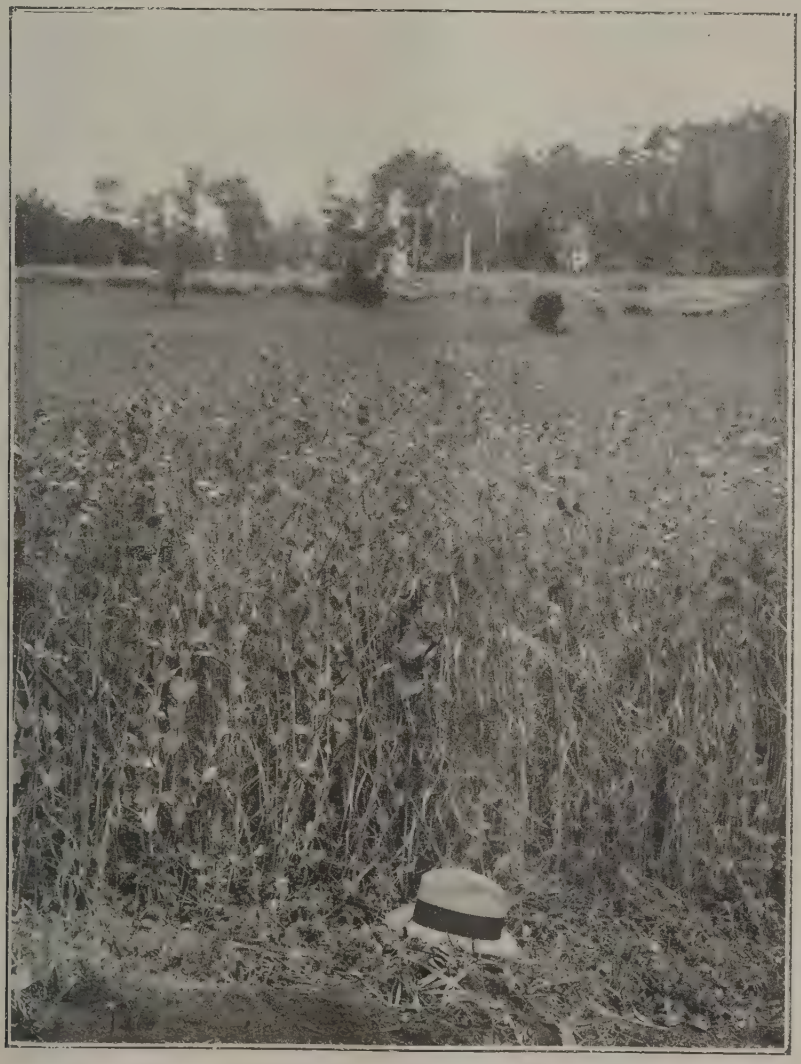

PLATE 76.—PATRIOT WHEAT AND FIELD PEAS AT MR. F. E. BURTON'S FARM, BRIDGES, N. C. LINE.

Plate 77.—Kudzu Vine (Fodder Plant), at Mr. H. M. McMartin's Farm, Pullen Vale.

RESULTS.

Varieties.	YIELDS PER ACRE OF GREEN FODDER.											
	A. Hulse, Yandina.				F. G. Burton, Bridges.				J. B. Stephens, Nindooimbah.			
	T.	C.	Q.	LB.	T.	C.	Q.	LB.	T.	C.	Q.	LB.
Prince wheat and peas	16	16	2	12	2	14	0	2	13	10	0	10
Prince wheat and vetches	10	16	0	8	6	1	2	4	11	17	2	20
Patriot wheat and peas	16	4	0	12	9	2	0	0	14	0	3	16
Patriot wheat and vetches	11	6	3	4	2	0	2	1	12	18	1	26
Rye and peas	10	16	0	8	5	5	1	9	14	11	2	22
Rye and vetches	7	11	1	0	Destroyed by wallabies				16	4	0	22
Cape barley and peas	12	3	0	9	10	16	0	8	13	10	0	10 (two cuttings)
Cape barley and vetches	7	11	1	0	2	19	1	19	15	2	2	0
Skinless barley and peas	11	6	3	14	Destroyed by wallabies				5	18	3	10
Skinless barley and vetches	5	13	1	21	Destroyed by wallabies				5	2	2	15
Ruakura oats and peas	9	9	0	7	4	3	2	25	18	18	0	14
Ruakura oats and vetches	7	11	1	0	Destroyed by wallabies				17	16	2	2
Algerian oats and peas	8	18	1	1	3	6	0	19	9	3	2	18
Algerian oats and vetches	6	15	0	5	Destroyed by wallabies				9	14	1	24

The yield generally on Mr. F. G. Burton's plots were reduced by the depredations of wallabies.

PLOTS AT TOOGOOLAWAH.

For some years the Department of Agriculture has endeavoured to interest dairymen and stockowners generally in the matter of fodder provision for their herds during those periods when, by reason of the lack of succulence in the natural pastures, yields from their herds have been considerably lessened, and, in some cases, even reduced within measurable distance of vanishing point.

The practice of arranging with interested farmers to carry out trials designed and supervised by officers of the Department, has met with a good deal of success. The results to date have clearly shown that by early and careful preparation, heavy returns are readily available of rich, succulent, milk-producing fodders, and that a continuity of this class of food can in normal seasons be kept up to tide milch cows over periods during which their productivity is affected by the gradual depression, induced in each animal's system, by being called upon to make use of rough grasses of low nutritive value, at a time when weather conditions were at their worst.

Ocular evidence has shown that improved milk supplies and a correspondingly improved return from the factory is inducement enough for other neighbouring farmers to profit by the example of the one who first adopted the system of growing crops regularly, for his dairy stock—actually, on a farm, an inexpensive method of maintaining an income.

In the present crop trials carried out on Mr. T. Coleman's property at Toogoolawah, no fertilisers of any kind were used. The plots were situated on well-prepared alluvial soil near Cressbrook Creek, which had been under cultivation for a number of years.

The plots were sown on 31st March, 1925, and were harvested for yield-computing purposes on 30th July, 1925, consequently each yield submitted represents four months' growth of fodder, and judged on this basis may be considered as highly satisfactory.

A more vigorous growth was noticeable in the case of Florence wheat and peas or tares and the Skinless barley with a similar mixture, both of which were well out in ear and rapidly maturing; rye had made a dense growth in both instances, but only a few heads were to be seen, and probably a further three or four weeks would be

required to bring it to a similar state of maturity to that obtained by the Florence wheat at date of harvesting. The following yields were recorded:—

	Per acre.			
	Tons.	cwt.	qr.	lb.
Florence wheat and peas	7	14	1	4
Cape barley and peas	9	11	1	0
Skinless barley and peas	10	15	1	0
Rye and peas	8	10	1	12
Algerian oats and peas	8	3	3	20
Canary seed and peas	11	8	0	24
Florence wheat and tares	7	4	2	16
Cape barley and tares	9	0	0	0
Skinless barley and tares	11	1	3	4
Rye and tares	12	13	3	20
Algerian oats and tares	10	15	1	12
Canary seed and tares	8	10	1	12

PLATE 78.

FLORENCE WHEAT AND TARES. Yield—7 tons 4 cwt. 2 qrs. 16 lb. per acre.

In view of the fact that some of the plots might be regarded as too immature for the purpose of obtaining the maximum yield, further weighings for comparative purposes were made on the 24th August, with the following resul's:—

	Per acre.			
	Tons.	cwt.	qr.	lb.
Algerian oats and peas	11	9	3	12
Rye and peas	8	13	2	8
Canary seed and peas	7	17	2	0
Algerian oats and tares	13	19	2	6
Rye and tares	9	9	2	16
Canary seed and tares	13	14	3	8

When selecting fodders for the test, cognisance was taken of their respective periods of maturity so that a continuity in the supply of green fodder might be kept up. Obviously the grower by using judgment in the matter of arranging for succession sowings should readily be able to maintain his supplies, and in this way ensure a more regular state of productivity in his herd.

Observations made respecting the period of development of the different crops were as follows:—Florence wheat and Dun field peas were ready for use earlier than any other single crop or combination, followed by crops in the order named: Florence wheat and tares, Skinless barley and peas, Cape barley and peas, Skinless barley and tares, Cape barley and tares, Rye and peas, Rye and tares, Algerian oats and peas, Algerian barley and tares, Canary seed and peas, Canary seed and tares.

Observations made indicate that it is advisable when arranging for mixtures of crops to confine the sowing of peas to the early-maturing cereals—Florence wheat, Skinless and Cape barley—as the peas begin to lose weight as they approach maturity.

PLATE 79.
FLORENCE WHEAT AND DUN FIELD PEAS. Yield—7 tons 14 cwt. 1 qr. 4 lb. per acre.

Tares on the other hand have a longer growing period and retain their succulence better than the field peas, consequently they are more suitable for use with Algerian oats, Canary seed, and Rye.

To those dairymen who are interested in maintaining supplies to their respective factories throughout the winter period, the following quantities are recommended for use in connection with the above class of fodders.

Wheat 30 lb., Dun field peas or Black Tares 20 lb.
Barley 40 lb., Dun field peas or Black Tares 20 lb.
Rye 30 lb., Dun field peas or Black Tares 20 lb.
Oats 30 lb., Dun field peas or Black Tares 20 lb.
Canary seed 10 lb., Dun field peas or Black Tares 20 lb.

DRY SEASONS—A COUNTERING FIELD CAMPAIGN.

The loss of national wealth to this State brought about by periods of drought cannot be accurately estimated by figures—but their effects are undoubtedly far-reaching. If action can be taken over certain areas whereby increased production can be brought about, it naturally follows that dry periods are robbed to some extent of their devastating influences and the loss to the State as a whole is decreased. A policy of this kind is naturally educative in its character to all, but when certain sections are dealt with it becomes more particularly of value to those directly interested, and this is increased when illustrations are given for the purpose of proving the policy advocated.

For some time past the Department of Agriculture and Stock has interested itself in increased production of dairy and allied products, and with this object in view has initiated a series of fodder trials in various districts for the purpose of pointing out that if means are adopted for the annual provision of fodder crops for dairy stock and pig raising, the fluctuations which have in the past taken place in the supply of these products will be considerably reduced if not entirely removed.

PLATE 80.

CAPE BARLEY (in shot blade stage) AND DUN FIELD PEAS.

Yield—9 tons 11 cwt. 1 qr. per acre.

During the past few months the losses to dairymen and others, brought about by lessened production resultant of the dry period experienced, amounts to a considerable value, and attention is drawn to the fact that these can be considerably reduced by adopting the policy of careful soil preparation and the sowing of crops calculated to fill the void caused by the absence or decreased supplies of natural grasses and herbage.

It was with such an object that dairy and pig fodder trials were established on the farms of Messrs. F. W. Thiedeke and Peel Caswell, of Beaudesert and Wangalpong respectively, and results obtained so far from portions of these plots

Plate 81.—Peas and Pilot Wheat at Beaudesert.
Weight—10 tons 13 cwt. 2 qr. 19 lb. per acre.

Plate 82.—Peas and Florida Wheat at Beaudesert.
Weight—11 tons 17 cwt. 2 qr. 20 lb. per acre.

PLATE 83.—PILOT WHEAT AND PEAS AT P. CASWELL'S, WANGALPONG (FODDER PLOTS).

PLATE 84.—FLORIDA WHEAT AND VETCHES AT P. CASWELL'S, WANGALPONG (FODDER PLOTS).

have proved the soundness of the principle involved. Both farmers are capable agriculturists whose methods of cultivation leave little to be desired, and who are fully seized of the importance of fallowing and thoroughly preparing their land prior to seeding operations. The results obtained on the comparatively low rainfall experienced at Wangalpong speak for themselves; and whilst the soil at Beaudesert is of a heavier nature than that met with in parts of the Canungra Valley, the heavier rainfall experienced more than compensated for the difference in soils and their moisture retaining qualities.

The plots were planted on the 9th and 10th June at Mr. Thiedeke's at Beaudesert, whilst those at Mr. Caswell's, at Wangalpong, were planted on the 12th and 14th of June. Rainfall experienced between the 9th June and 23rd September (the date of harvesting) at Mr. Thiedeke's being 3.66 inches, but it must be noted that a fall of 1.06 inches was experienced on 7th June, two days prior to planting. At Mr. Caswell's the rainfall received between the 12th June and 24th September totalled .91, the previous rains to that date being 1.25 inches, registered on 14th and 17th May.

The following weights of green fodder were recorded:—

	Mr. F. W. Thiedeke, Beaudesert.				Mr. P. Caswell, Wangalpong.			
	Tons.	cwt.	qr.	lb.	Tons.	cwt.	qr.	lb.
Florida wheat and peas ..	11	17	2	20	7	6	1	22
Florida wheat and tares ..	10	8	3	13	7	4	0	5
Pilot wheat and peas ..	10	13	2	19	8	5	2	17
Pilot wheat and tares ..	10	4	0	7	6	12	0	5
Skinless barley and peas ..	11	8	0	8	6	4	3	10
Skinless barley and tares ..	4	16	0	3	7	1	2	16
Cape barley and peas ..	6	2	1	21	4	18	1	20
Cape barley and tares ..	9	7	1	1	4	16	0	3
Rye and peas	5	15	0	27	4	16	1	20
Rye and tares	8	0	3	11	3	7	0	25

The varieties of wheats used in the trials were Pilot, a Bunge-Florence crossbred, and Florida, a Bobs-Florence crossbred, both of which were raised at Roma State Farm. These varieties made excellent growth, and were remarkably even throughout the trials. At the time of harvesting both varieties were in the flowering stage, averaging 3 feet 6 inches in height.

At Wangalpong both Pilot and Florida showed signs of flag-rust, but at Beaudesert no signs of rust were apparent. This was propably due to local conditions and to the fact that humidity in the Canungra Valley is greater than in the more open areas around Beaudesert.

Cape Barley.—This crop made fair growth and when harvested was in the shot-blade stage—the height averaging 1 foot 9 inches of good healthy growth. From the general appearance of the crop a later cutting will give a heavier yield.

Skinless Barley was a clean and attractive crop, averaging 3 feet in height, which had made a remarkable growth of foliage. When harvested the grain was in the soft dough stage.

Rye.—In each case this crop made rapid growth, and was in the flowering stage when harvested, averaging 3 feet in height. Generally speaking, growth was somewhat on the thin side, and heavier quantities of this cereal should be sown when the season is somewhat advanced, as it was in this particular instance.

Field Peas in all plots made fair average growth of 1 foot 6 inches in height. When harvested they showed signs of wilting, thus reducing the weight per acre that under other conditions would have been recorded.

Vetches, usually rather slow in maturing when compared with peas, made favourable growth.

The pig fodder plots were not sufficiently far advanced in growth on 23rd September to justify their harvesting, consequently this matter was deferred till 24th November, but during this period a further rainfall of 326 points was received and recorded as follows:—25th September, 32 points; 28th September, 166 points; 16th October, 46 points; 25th October, 9 points; 16th November, 73 points; total, 326 points.

As a result increased growth was in evidence compared with that shown on the occasion of the previous visit.

As in the case with the dairy plots, Mr. Caswell had given careful attention to the cultivation of the various fodders, and an entire absence of weed growths was noticeable.

The various yields recorded can be regarded as valuable illustrations of what can be accomplished by careful and systematic cultivation of crops that are suited for purposes of economic pig feeding and can be produced at little cost to the grower.

The following are the yields recorded:—

	Per acre.			
	Tons.	cwt.	qr.	lb.
Thousand Headed kale	11	15	3	3
Dwarf Essex rape	6	9	2	16
Yellow Globe mangels	29	8	1	20
Long Red mangels	23	19	2	12
Purple Top Swede turnips	14	18	0	27
Elephant Swede turnips	12	13	3	18
Sugar beet	17	6	2	12
White Belgian carrots	12	13	3	18

The Dwarf Essex rape suffered somewhat from the attacks of Aphis, whilst the foliage of the Swede turnip was subjected to the attentions of the Rutherglen Bug; otherwise the crops were excellent in every respect.

AGRICULTURAL EDUCATION AND RESEARCH—CALIFORNIAN METHODS REVIEWED.

J. W. HOWIE, Queensland Agricultural High School and College.*

Jack London's statement that "The Swiss exhibited great resource in imitating California's lakes and mountains," while a good jest, is in some way an indication of the Californian's opinion of his State. That is the first and most lasting impression one brings away from California. It is undoubtedly a remarkable State —remarkable for its soil, its waterways, its snow-clad sierras, and its climate. Its citizens are out to "tell the world" of its wonders—to boost it in their own phrase. Successful advertising has made California a world-wide tourists' resort and placed Californian products on the dining tables of the Globe. Give the Californians their due—they have succeeded in making good their boasts. Their highways are the show windows of the State. Surfaced in concrete, lined with trees and palms, they are the motorist's paradise, and there are thousands of miles of them. The skyline-boulevard, La Honda, Grade, the coast route from Los Angeles to San Diego, are all roads that are triumphs of engineering; banked on the curves they sweep smoothly over range and plain from San Francisco to Mexico. These roads have been financed by special issues of bonds within the State paying 5 per cent. There is no problem of dual traffic to face. The horse has disappeared, save in some mountain sections, and among the peat flats of the deltas of the San Joaquin and Sacramento Rivers. Concrete is their road material. Asphalt was tried, but under the blistering sun it soon unpleasantly resembled a washboard. A stretch still in existence, near Stockton, would disintegrate a steam roller. Their cities and towns are well planned, with wide streets. Their buildings and homes are well built and painted; though they do disfigure the highway with gigantic and garish advertisements. Town planning and good roads, power, and good lighting are articles of faith. Even the smaller Californian cities give a passable imitation of Broadway at night. Power is cheap; the waterfalls and melted snow of the Sierras provide most of it. The power lines swing down from the mountains across the broad fertile inland valleys. The farmer has a transformer, and steps the 18,000 volts down to a mild enough current to light his home, milk the cow, and turn his separator. The harnessing of some or our sleeping giants in Queensland, in the shape of such falls as the Barron, would benefit extensive rural communities by the supply of similar power.

Irrigation Farming.

The Californian—in fact the American generally—possesses a genius for being organised and drilled—from a "Swat the Fly Campaign" to a presidential election. At once a great strength—witness the successful farming co-operatives; the standardisation and the quality of Californian canned products and dried fruits; and a considerable weakness—the exploitation of the citizen by the "big money" interests, and the ease with which the public can be stampeded on political issues. In certain directions more of this capacity for organised action might be valuable to us here.

* In the course of a recent radio lecture from the Queensland Government Radio Station, 4QG.

The combating of droughts, the fighting of fires in country districts, the dissemination of scientific agricultural information, the control of disease-carrying mosquitoes, are points that occur. In rural fire-fighting in California they have followed the practice of establishing fire districts, raising funds locally to purchase equipment. An outfit costs usually from £800 to £1,000. The larger units are augmented by groups of smaller units and individual plants on the farms. The organisation and equipment have proved satisfactory in controlling grass and grain fires. Drought is a less serious business in a country with good waterways and melting snow, but California has a low rainfall, and water conservation and irrigation have gone hand in hand. It can be dry in the interior valleys. The Imperial Valley, before the Colorado was empanelled, was dry—so dry that one old-timer reckoned they had to carry drinking water to the fish! To-day it is the truck garden of the South. Irrigation farming on the citrus areas of Southern California has brought fruit-growing to as near factory production as is probable with anything so plastic as growing trees. The Sespe Ranch, in Southern California, carries an agricultural chemist and irrigation expert, whose job it is to make moisture determinations throughout their groves, and to recommend the amount of irrigation water to apply. The water is distributed by furrows and basins. A blue print of the grove is kept; every tree is numbered, and records kept of production, diseases, fertilisers applied, &c. The fruit is carted to one of the sheds, graded, sized by machine, packed in standard packages, and railed in iced cars to their representatives in distant towns and cities. The citrus organisation has been explained at length many times in Australia. I would just like to indicate that it is very complete and handles its own distribution through its own selling floors in the chief cities of U.S.A. It numbers 10,700 growers, delivering fruit to 206 local associations, which in turn operate through nineteen district exchanges. One central exchange controls the selling machinery, advertising, &c., and disseminates market information. The whole organisation is run on non-profit lines for the growers' benefit.

Organisation Methods.

The Californians generally have adopted organisation by commodities. There are apple, pear, peach, prune, walnut, citrus, raisin, and avocado growers' associations. Some effort to amalgamate certain of these lines has been attempted lately. Unification of all dried fruits under one distributing agency known as "Sunland Sales" is being mooted—actually a sort of co-operative union of co-operatives. It has met with a good deal of opposition from sections of the growers, for there, as here, there are many who maintain that broker selling and the use of established channels of distribution is a sounder proposition than attempting direct sales. Brokers have capital and trade connections; "let us use them," say this section, "but let the broker be good." The latest move is to have a Commission Dealers' White List drawn up, and the dealers thereon are to sign a contract agreement with the U.S. Department of Agriculture to be honest and faithful, to treat producers and customers with equal fairness, and to conform to U.S. standard trading rules. Certainly a desirable consummation, but not so readily attained in a cold, hard world. Agricultural education and research have attained a very high standard. The whole State is divided into counties, and each county has a resident farm adviser. That official maintains contact with the University of California and the various experiment stations throughout the State. He is able to assist the farmer and fruit-grower very directly with their problems of production, pest control, and marketing.

University Work.

A few of the problems that are being tackled by the University include the production of disease-resistant varieties of peaches, pears, and other fruits; the investigation of the potentialities of tropical fruits, such as avocadoes, mangoes, custard apples, papaws, and passion fruit in the southern parts of the State; the commercial production of the Guayule shrub introduced from Mexico, a shrub which produces up to 17 per cent. of crude rubber. In a country where motor cars reach the astonishing total of one to every 2.9 persons, any home source of rubber is of paramount interest. The canning and dried fruit interests owe much to the University Researches in dehydration and the preparation of fruit products such as pulps, syrups, and essences. The foregoing are a few impressions of rural life in California. California, though a prosperous State, is not an El Dorado, and none would recommend us to indulge in the slavish imitation of their modes of life and merchandising (in some directions we have overdone that already), but undoubtedly we can with profit adopt some phases of Western life to our conditions here. Their trenchant pride in State and town, the community clubs and live chambers of commerce, and the intelligent adaptation of scientific knowledge to farming have made rural life for them vital and interesting. Life in our country districts leaves room for just those characteristics.

MERINO WOOL CLASSING FOR SELECTORS.

By W. G. BROWN, Instructor in Sheep and Wool.

In the classing of small clips, or farmers' lots, it is not necessary to go into very scientific classing, as the main idea for every small man to consider is to class his clip into even lines, and, at the same time, make as few sorts as possible. For buyers prefer long lines to short ones. For instance, a buyer may be able to fill an order with one line of wool. Where this is the case, he gives the manufacturer a more even line by virtue of its being more evenly bred from one type of sheep, showing the same characteristics in regard to the soil, seed, burr, &c. It requires the same treatment in the course of manufacture.

It is unreasonable to expect that a buyer having an order for, say, fifty bales of wool and selecting from different clips, could give the manufacturer the same satisfaction as if he obtained it from one clip.

A buyer will often advance ½d. per lb. to fill his order with one brand.

For the smaller holders of sheep it is much better that he should mark his small clip (in place of branding it combing, clothing, &c.) AAA, AA, A, broken, pieces, locks, &c.

If a wool marked clothing were suitable for a combing order—and the Continental manufacturers comb shorter wools than Bradford—it may cause the buyer to think there was a mistake made. Owing to the relative evenness of quality in merinos, fineness would not play an important part in the classing of this type of wool. It should be classed mainly to length and soundness, yield, and general characteristics —namely, colour, style, vegetable matter, &c.

The Object of Classing.

The object of classing in any clip is to make the class or classes even in quality, length, and condition. Irregularity in classing means that a buyer valuing a sample lot, who sees wool of different values in the same bale, will naturally give preference to the lowest-priced wool he sees in the sample bales. He has no means of learning how much of the inferior wools may be in the bulk from which the samples are drawn. Or, having an order to fill for a particular type, he is likely to pass the unevenly classed wools. Thus competition is lessened, and the result to the owner is a decreased price.

Wool-classing is the separation of the whole fleece, after it has been skirted, into typical grades. These fleeces individually may contain several "sorts," but these are separated by the "wool sorter," a distinct business from that of a "wool classer." This lecture is not dealing with the larger clips, but is addressed to holders of from three to four thousand sheep, who cannot afford the services of a skilled wool classer.

Merino wool holds far fewer difficulties for classification than crossbreds. It is thus much easier for a man to learn how to class his small flock of merinos, than if they were of mixed breeds.

Counts, Quality, and Yield.

In the first place, the "counts" on which "quality" is based have a comparatively small range in a merino flock. These counts in merinos range in Queensland between 60's and 80's, that is 20 counts; not a great deal of the latter being produced. In crossbreds they may range from 26's to 64's, nearly 40 counts. Now, a "count" means:—One hank of spun yarn equals 560 yards in length. Each count equals one hank. Therefore the number of counts multiplied by 560 equals the number of yards of yarn to the pound avoirdupois of wool. Here is an illustration: In a 60's count top, 560 yards of yarn multiplied by 60 (the count) equals 33,600 yards of yarn in 1 lb. of 60's top. This for quality, which means relative fineness. In the second place the question of "yield" comes in. This is governed by the amount of condition (otherwise wool fat and extraneous matters) in the fleece. Besides the wool fat, and other constituents of the yolk, there is sand, seed, and other matters.

"Yield" means the clean scoured product of greasy wool. All wools irrespective of quality are bought on their yield of clean wool. The method of determination of yield is illustrated in this example:—A line of wool is estimated by the buyer to yield, say, 48 per cent., the clean value of which is 58d. per lb. Thus the greasy cost will be 48 per cent. yield, multiplied by 58d. per lb. clean scoured and divided by 100, which means that the value of greasy equals about 27¾d. per lb.

I am calling attention to the meanings of count and yield to emphasise the necessity of classified wool being even in quality (or counts) and (yield) meaning condition, because quality, condition, and length are the chief factors in the valuing of any wool.

The buyer, of course, is skilled in determining in the sample before him both count and yield. This is a matter of training, otherwise he would ruin the manufacturer if he were out even 2 per cent. on a big purchase.

Now this accentuates the value of evenness in the classification by the smaller grower. He may not know counts; he may not know yield; but he should know relatively his light, fine, bright, long fleeces from his dull, short, heavy fleeces, and between the two the fairly fine, fairly light, and decent coloured fleeces.

Thus his classes should be:—Supposing he shears from 3,000 to 4,000 sheep, all merino AAA, lightest, brightest, and longest stapled wools. These fleeces are the cream of his clip and great care should be taken that the class be kept as even as possible. If there be a doubt about a particular fleece, the doubtful one should go into a lower grade. This applies also to the other classes.

AA is fairly light in condition, a good colour, but shorter than the AAA.

A consists of the short-stapled, dull, heavy fleeces. If any matted fleeces be found, they should be cast into another class or broken into the pieces. There will be little of this.

Skirting.

This is a very important part of the work in the shed. If the wool be free from seed he should skirt very brightly. If with seed on flanks and breech, the seedy wool should be skirted off. If very seedy or burry, it is better to take off only the fatty poonts and stained, classing the fleeces as above.

The pieces should be "sorted" note the word, into broken or first pieces, and, pieces. The broken contains the brightest, cleanest, and best pieces. The "pieces" will take the rest when dags and stains are removed.

Stained wool should be separated and baled or bagged by itself.

Bellies should always be packed separately after the stained wool is removed.

Rams' wool, because it is generally much heavier in condition, class for class, than the flock wools, should always be packed separately.

Picking up.

"Picking up" is important, in that, if the fleeces are badly thrown on the table, there is apt to be bad skirting—either excessive or too light. The boys who perform this operation should be instructed to take the belly wool as the shearer cuts it off, and after removing the stained wool put it into a receptacle on the shearing board. He should take the fleece when the sheep is finished by each breech with the skin side uppermost, and then when he reaches the table he should throw it out with the breech end nearest to himself. With a little practice anybody can throw a fleece evenly and correctly.

Rolling.

Of late years the operation of wool-rolling has tended to be what we would think in other days "stommicky." There is not the care used to-day generally in rolling the fleeces properly. When the fleece is thrown out the skirting should be carefully done as directed above, and, after the neck wool is thrown in about the third of the total length, the two sides or flanks are folded across, leaving the fleece in a strip about fourteen inches wide. Then the wool roller should start at the breech and roll the fleece up to the neck end, and the result is a ball of wool showing the shoulder wool. The fleeces are then classed and put into the appropriate bins.

Wool Pressing.

The pressing should be so done that a neat square bale is turned out, with no wool showing at the corners. The aim is to have even weights in the finalised bales. The patent fastener is much better to use than the old-fashioned needle and twine. About 320 lb. net is a good average weight for most fleece wool; flocks and belly wool up to 448 lb., pieces about 350 lb.

An important matter, too, is the keeping the floors clean, both on the board and the wool-room. Locks and second cuts lying abut when pieces or fleeces are, as is sometimes unavoidable, placed on the floor, and nothing detracts more in the appearance and value of a fleece covered with locks stained or second cuts.

The foregoing is a fairly comprehensive instruction for the tyro in a wool-shed, at shearing times.

Remember the sorts, whatever they may be, must be even in length, quality, and condition. The skirting must be carefully done. The picking up must be properly learned and used. The broom should be used frequently. If a sheep farmer does these things he will not need to fear the result when the buyer gets his hand on his clip.

COTTON CROP PROSPECTS.

The Cotton Specialist of the Department of Agriculture, Mr. W. G. Wells, returned recently to Brisbane from a tour of inspection of the cotton experiments and the general conditions in the cotton areas along the Gayndah line and up through the Upper Burnett. He was accompanied by Mr. N. E. Goodchild, Senior Field Assistant in charge of the experimental work in the Burnett, and also from Mundubbera onwards by Mr. E. Widdup, assistant to Mr. Goodchild in those areas.

Experimental Work.

The main purpose of the tour was to inspect the several experiments which the abovementioned officers have been conducting in co-operation with cotton-growers in the different districts along this line. These experiments included varietal trials of the more promising varieties which the Department is investigating—thinning and spacing tests, and fertiliser tests. The object of this experimental work is to assist the cotton-growers to learn the application on his own soils of the results of the experiments performed at the Callide Cotton Research Station and of the general observations which have been made on the behaviour of the cotton plant on the main types of soils of the cotton-growing areas. The growers in many cases are assisted in the thinning of the plots, and the general care which has been given is gratifying evidence of the keen interest which the growers have shown in the Department's efforts to help them solve some of the more important problems.

The erratic climatic conditions which have existed during this season have not been conducive to obtaining satisfactory results from many of the experiments, but sufficient data will be obtained to throw light on some of the problems, especially such factors as the spacing of the plants and the height at which to thin them. Satisfactory evidence was seen in many instances on different soil types of the value of early spacing of the plants to distances of approximately 2 feet apart, and it is to be hoped that this custom will become more universal from now on.

A Striking Peculiarity of Plant Growth.

One very striking peculiarity of the plant growth was noted in all districts and on all types of soils. This was the loss of the terminal or growing bud of the main stalk. The explanation of this phenomenon is not clear, but may be due to a combination of insect attack and soil conditions. The worst attacks were experienced on the brown scrub soils overlying grey clayey subsoils. In such instances a very high percentage of the terminals were lost during the excessively heavy rains which occurred during early January. Where the growers continued cultivation so as to aerate the soil, a fair growth of the laterals or vegetative branches, accompanied by a fair crop, developed, but if no cultivation was given the crop after the loss occurred, practically no growth developed, with a consequent loss of crop. It is not believed that this is to be a regular occurrence, as many of the fields where such attacks occurred have borne excellent crops in the past, and it is anticipated that under more favourable soil conditions such can be obtained again.

The Maize Grub.

In some of the districts the Corn Ear Worm (maize grub) had done appreciable damage, especially on the late-planted cotton. In nearly every area, however, there were plots of early-planted cotton which were heavily laden with fully-matured and opening bolls. It was ascertained that such plots had been planted on early and well-prepared seed beds, which had enabled the young plants to go through the severe droughty conditions of last October and November without too serious a check on the development of the fruiting system. When the first rains in December occurred, such crops developed a heavy setting of fruit all over the plant. This load controlled the growth, and resulted in a toughened structure that apparently was not attractive to the Corn Ear Worm.

It was noticed, however, that all early-planted crops were not immune from the attacks of this pest. Where such crops had lost the terminal bud a forced growth of vegetative branches developed, which only bore fruit comparatively late in the season. In reality such plants were nearly like late-planted cotton, and the succulent nature of such growth during the heavy rains of January and February produced a crop of squares and bolls, which in many cases was very attractive to the Corn Ear Worm.

Crops in the Upper Burnett Land Settlement Project.

The best crops, taking the districts as a whole, were observed in the Upper Burnett Land Settlement Scheme, where some 4,000 acres give promise of bearing profitable crops. In the case of early-planted crops which came through the early droughty conditions without too serious a check, exceptionally heavy crops appeared

to be the rule. The later planted crops in some cases had lost most of the bottom crop through boll rots caused by the excessive humid conditions and shade in the tall plants, but the middle and top crops gave promise of exceptionally heavy yields, provided the first frosts do not come abnormally early.

Picking operations, provided the sunshiny weather conditions which have existed during the last three seasons in the Upper Burnett at this period of the year are in force, should be commencing by the end of this month and be in full swing by the middle of April. From the appearance of the opened bolls which were observed, and the general size of the nearly matured unopened bolls, the weight of the bolls should be exceptionally heavy this season. The quality of the matured cotton which was seen was of high standard and the fibre was of heavy body. All of these factors should make heavy picking tallies if the cotton opens like it has previously done in the Upper Burnett.

A very gratifying interest in the general condition of the cotton industry was shown in all districts visited. This is in marked contrast to the ideas of many people not directly interested in the cotton industry who seem to think that the cotton industry has failed. In reality it is on a better footing than it has ever been. In the early years of the present revival of the cotton industry, there was an appreciable migration of people from the cities to grow cotton, who in many cases paid exorbitant prices for land, under the impression that remarkable financial returns were to be received from cotton-growing. Unfortunately many wild statements by misinformed individuals as to the methods of cotton-growing, the suitable classes of soil, &c., were circulated. Naturally when non-profitable results, and in many cases complete failures, were experienced by such speculators, and by actual farmers as well, a period of depression set in which checked all expansion, and in some districts nearly eliminated cotton-growing. The men who are growing cotton to-day are generally much better experienced than were a majority of the growers during the first few seasons, and, as a rule, understand the general principles of cotton-growing to a much better degree. In nearly every district there are growers who have made profitable yields every season. These men are having a very decided beneficial effect on their districts, and as their methods become more carefully followed the average yield per acre will show decided increases.

In nearly every district visited the growers were satisfied that, given anything like favourable growing conditions next season, a very good crop could be produced. Everyone realised that this season has been the first since the cotton industry has been revived, that the subsoils have received thorough soaking rains. The effect on the cotton plant next season should be decidedly beneficial. During the past five seasons in nearly every district the amount of moisture in the subsoils has been so low as to necessitate frequent rains in October and November in order that the steady development of the young plants could take place. Fortunately these rains have occurred in many districts in every season, so that good yields have been obtained. The present season has been an exception in this respect, which accounts for most of the failures which have occurred, and also for the loss of the bottom crop in many areas where good top crops are to be obtained. If the growers prepare the seed beds at an early date so as to take advantage of the present soil moistures, it is anticipated that exceedingly heavy yields of cotton will be obtained.

Price Prospects.

Present indications point to very satisfactory prices being obtained for the coming season. These may be slightly less than the top grades have received in the past. It must be remembered that the prices on the world's markets are considerably less than those which have existed in previous seasons. Consequently any prices for this season in Queensland approaching those of past seasons should be taken as encouraging indicators of what may be received when the world's markets get over the effect of the huge crop which was grown in the United States of America this last year. If the prices which appear possible at present are realised for this season's crop, it appears that a decided increase in the acreage of the cotton crop will be planted next season.

If you like the "Journal," kindly bring it under the notice of your neighbours who are not already subscribers. To farmers it is free and the annual charge of one shilling is merely to cover postage for the twelve months.

MALNUTRITION AMONGST STOCK.

W. G. BROWN, Instructor in Sheep and Wool.

A most interesting report has recently been published by the Empire Marketing Board in Great Britain. In the section devoted to sheep something has been said of deep importance to Queensland. Here is an abridged résumé of this section:—

"Malnutrition amongst Stock.

> "Upon the advice of the Committee of Civil Research a grant has been made to further the study of those causes which, in widely separated parts of the Empire, underlie persistent symptoms of malnutrition amongst flocks and herds. Preliminary work by the Committee of Civil Research, including the circulation of a questionnaire to all oversea Governments of the Empire, showed that malnutrition of this type was almost universal in natural pasture lands. Work undertaken at the Rowett Institute, Aberdeen, in connection with sheep in the west of Scotland gave a clue to the solution of the problem, as did also work performed by the Onderstepoort Station, in South Africa. With the encouragement of the Empire Marketing Board, and in some cases with assistance from the grant, research into this problem has already been extended to Kenya, and is in course of extension to Australia, Southern Rhodesia, and, it is hoped, Palestine. As the Imperial Economic Committee lately pointed out, the grass crops of the Empire are as important as its cereal crops. Should research on this problem fulfil its early promise, the value of natural grass crops will have been notably increased throughout the Empire."

I have seen the questionnaire referred to, and have put in some replies bearing on the subject-matter and will reproduce them.

The Position in Queensland.

The first question asked was, "Are there in Queensland areas where the death rate of stock, apart from disease, is notably high?"

Yes, there are districts in Queensland where it is difficult to rear lambs. There may be an 80 per cent. drop, but not more than 30 to 40 per cent. reach maturity. Forty or fifty years ago there was no difficulty in rearing lambs in these districts, where to-day wethers are purchased in Western country and only wool is grown. It is evident that this is purely a matter of malnutrition—that is, the grasses do not contain the essential properties they once possessed. The matter is not one of time of year for the lambing; amount of feed in the paddocks; management; for some of the very best managers in Queensland find the same trouble as the beginner. Nor is it a matter of the seasons. Now this is an Empire-wide problem, for, as was said in the above report, "the grass crops of the Empire are as important as its cereal crops." It is especially a Queensland problem, for this State relies more on its grass crop every year than all the others put together. Nobody could give a reason for the failure to rear lambs, until about four years ago when Mr. Brunnich, Agricultural Chemist of the Department of Agriculture and Stock, threw light on the matter.

He called attention in his analyses of Queensland soils to the fact that even in the beginning phosphoric acids were not plentiful in Queensland. He showed, too, that milk, wool, beef, mutton, &c., require a certain proportion of phosphates to produce high-class products.

We know that in some cases grass has been cropped by stock for from sixty to eighty years. The wool, beef, mutton, &c., have been sent away from the holding, and—*here is the crux of the matter*—nothing has been returned to the land.

No wonder that when ewes wean their lambs prematurely the result is premature death to the lambs. The ewes cannot produce the necessary milk owing to lack of phosphates and other minerals.

The land is starved, and in consequence the stock are really starved—that is, they are suffering from malnutrition.

A Western Experience.

I was employed for many years on a Western property running up to two hundred thousand sheep as sheep and wool classer. There were many droughts during the thirty-six years I was connected with the flock, and it was noticeable that of lambs dropped after a drought there was a noticeable percentage of deformed animals, as high in one case as 25 per cent. A few years ago in the same district, after a drought, be it noted, a veterinary officer from the Department of Agriculture and Stock investigated the question of *Osteo Malacia* (in the vernacular, "Rickets"),

and found many cases in a mob of cattle. They were observed to chew the bones of dead animals, showing that they required phosphates in some form or another.

Several years ago, parts of Norway were notorious for ricketty cattle and sheep. A scientific investigation was made. It was found that the worst onset of the disease was when a dry time had been succeeded by a wet season. An outstanding symptom was that the animals chewed bones when they could get them.

A recommendation was made that bone meal and phosphate licks be offered the animals. The evil disappeared. It is not practicable to top-dress our pastures with phosphates excepting on very limited areas, but in another way phosphates may be given back to our pastures, and at the same time these minerals may be given directly to the animal, and thus supply the lack in the grasses for the time being.

I have consulted Mr. Brunnich on the matter of a lick for Western conditions. He advises:—"The best lick for sheep is—40 lb. sterilised bone meal; 40 lb. finely ground phosphates; 20 lb. salt.

"It is not necessary to give too much salt, especially where there are saline bores. It has been proved that less hay or grass is better digested with phosphates than more hay without. The one helps the other, with much better results to the animal."

SOME NOTES ON SHEEP.

By W. G. BROWN, Instructor in Sheep and Wool.

Dentition in Sheep.

A most important matter in the keeping of sheep is the matter of judging the age of the animals. From the number of inquiries reaching the office concerning the subject, I conclude that a description of animals' mouths from birth to maturity will be useful to those whose knowledge of sheep is small.

It must be remembered that sheep, of the various breeds, differ in the matter of dentition. The merinos, for instance, seldom show their permanent cutting teeth before fourteen or fifteen months old. British breeds may show them at twelve months. In buying sheep, as in all other things which are bought and sold, the old Roman adage, "Caveat emptor" ("Let the buyer beware") applies, and a man who believes that he is buying young animals without knowing that they really are young or old stands a very good chance of making a bad bargain. I know of two particularly hard cases to the buyers, neither of whom understood sheep and consequently were saddled with unsuitable animals.

In the first case, the buyer thought that he was inspecting wethers of from two to three years old. He really bought sheep not less than six years old, and quite 20 per cent. "broken-mouthed."

In the second case the sheep were supposed to be young wethers. They were young enough, for they were certainly not more than five months old, and quite unsuited for the purpose for which they were bought—*i.e.*, fattening quickly for market. Wether lambs was their proper designation. An elementary knowledge of dentition would have saved the buyers from mistake on account of age at least.

At birth, a lamb possesses two central temporary incisors, and at the end of four weeks all the temporary incisors (milk teeth, eight) are up, with three molars or grinders in each of the upper and lower jaws on both sides.

From the age of four weeks to the time of cutting the central permanent incisors, at from twelve to fifteen months, the only changes that occur are in the molars.

At three months the fourth molar is cut, and is a permanent tooth. Six months later another molar, the fifth, is to be seen.

At eighteen months the sixth permanent molar is cut; the third temporary molar, like a shell, covers the top of the permanent tooth, while the first and second permanent molars have pushed off the temporary ones. Thus, a sheep has all its permanent molars at from eighteen months to two years old.

With the incisors, the first two, or central permanent teeth, make their appearance at from twelve months in early, and fifteen months in late dentition. At from eighteen months to twenty-four months, the second pair of permanent incisors are up; at from twenty-seven months to thirty-three months, the third pair are in use; and from thirty-six months to forty-two months, the fourth and last pair of permanent incisors are shown, and the sheep is "full-mouthed" in all breeds at about four years.

After this, it depends upon the class of country, and the early or late maturity of the breed, or to the wear of the teeth, whether the mouth is defective or otherwise. Only experienced sheepmasters can, even approximately, give the age of any particular animal after maturity. In the case of "broken-mouthed" sheep it is wise, if only three or four or fewer teeth are left, to pull them out and leave the

animal "gummy." They cannot bite with odd or gapped teeth as well as they can with gums.

Other indications of old age are dependent paunch, sagging of the loins, distended nostrils, deterioration of fleece in quality and quantity, and malformed feet.

Lambing Percentages.

This is an important matter, especially after the serious losses sustained during the drought.

The best and most consistent high-average lambing was on a Western station I know well. Rarely was the percentage under 80, and shortly after the big drought 1900-2, 30,000 ewes gave a drop of 33,000 odd lambs—a record, I believe, for Australian merinos.

The method used on this holding was, in short:—They had general shearing in March. Three months before the general shearing the rams were shorn. At shearing time, when the ewes were being put through the shed, I was asked by the owner, "How many will you shear to-day?" I gave the approximate number I expected to shear. The sheep were counted out on each side of the shed, and held there all day. Two per cent. of rams were put in with them in the counting yards, and left there all night. Next morning at daylight they were driven six or seven miles to a yard on the run and kept there that night. Next morning they were taken to their paddock. About a month later another 1 per cent. of rams was put with the ewes, and the result was as above stated—30,000 ewes, 33,000 lambs. I know this to be true, because I was running the shearing part, and saw the lambs twelve months later. This is no place to discuss the why and wherefore, but it is certain that the process was a physiological application of well-known rules of stock-breeding as applied to sheep.

The Relation of the Merino Country to the Crossbred Country.

As a general principle, the Western country is not a fat-mutton proposition. It is merino. Yet there is, or should be, a connection between the coastal areas in this way. There being only, at most, 4 per cent. of British breeds and their crosses in Queensland, it is most difficult to get a sufficient number of crossbred ewes to use on coastal areas. It is in the coastal areas where fat-lamb raising is not precarious. The coastal areas, too, are not suited to the merino, nor is the pure merino the best mutton or fat-lamb sheep. It is too slow in maturing and too dainty to fatten quickly on coarse feeds.

It would certainly pay sheep holdings where the ewes are cast for any reason, to join Corriedales, Romneys, &c., to them before they leave the station. Their value would be enhanced at least 7s. per head if they were in lamb to British sheep. I would like to say more on this subject, but space is limited.

A question which is worth investigation is: What is the probable waste in condition or value on fat sheep from the station to the butcher?

Little has been done in Queensland in this direction and it is surely important enough. A few trials were made by Mr. J. Wrenford Matthews, Sheep Expert to the New South Wales Government, some years ago. Although it applied in those cases to crossbreds, it will apply to merinos. It showed that there was a wastage of from 6 to 8 per cent. in journeys of forty-four hours and twenty-four hours. Of course, there was a certain amount of this loss due to excretions. There was, however, another test made, when the sheep were not trucked and weighed until they had been fifteen hours in the yards. There was a loss in forty hours' railage of about 6 per cent. This is a question which would pay to investigate, and if necessary, action could be taken to save that 6 per cent. It is probably higher in our case in the summer.

External Parasites.

Are they likely to invade the West?

Undoubtedly. The Nasal Fly, for instance, is now well entrenched. I receive grubs from Cunnamulla, Roma, Longreach, Charleville and other Western centres.

Sheep lice (*Trichodectes Sphanocephalus*) and the "Sucking Louse" (*Linognathous Ovillus*) are spreading, especially the former. They are to be found over one-third of Queensland.

The Sucking Louse, which has only recently shown itself, is a far more serious pest than the ordinary sheep louse, yet is found in the Charleville, Winton, Hughenden, Aramac, and other districts. Dipping in a good arsenical dip will stop this pest in short order. I would advise all sheep men to look well into the matter at shearing time. The wool is ruined and sometimes the sheep die, for these lice suck blood, and the wool contains millions of shining eggs and thousands of lice.

BROADCASTING OF FRUIT PRICES.

Recently a Redland Bay correspondent wrote regarding the broadcasting of fruit prices from the Queensland Government Radio Station, 4QG. His letter was referred to the Director of the Queensland Radio Service, Mr. J. W. Robinson, who replied direct to our correspondent as follows. His remarks are of interest to farmers generally:—

"... I have noted with interest your views regarding a cessation of the broadcasting of fruit prices as supplied by the Committee of Direction.

"I am afraid, however, that you do not realise the exact position which has arisen in connection with the transmission by radio of this matter, and I hasten, therefore, to acquaint you with the full facts of the case.

"In the past, the market reports broadcast by 4QG were supplied by the Council of Agriculture. The Council was given sole and exclusive rights for the supply of all market information to farmers by radio, and paid to the Queensland Radio Service a sum of £1,000 per annum. The duration of the market session conducted by the Council under this arrangement was three-quarters of an hour per day for five days a week. The cost to the Queensland Radio Service for the running and staffing of the station for the market report session alone amounted to, approximately, £2,500 per annum, and the charge made to the Council was not, therefore, an actual charge, but was rather in the form of a subsidy which went a little way towards helping to defray the costs of providing an efficient service to farmers. When the Radio Station was first established, the Council regarded the matter in this light, and in negotiating with the Radio Station offered the £1,000 per annum as a subsidy if the station would allow it to provide a farmers' session.

"Towards the end of last year, the Council signified its intention of discontinuing this subsidy, and my Department was, therefore, compelled to make other arrangements for the supply of market information by radio.

"Realising that fruit prices comprised only portion of the market service, I approached the Committee of Direction and offered to broadcast information supplied by them for the benefit of their clients if the Committee would be prepared to pay a slight sum towards the cost of maintaining the station. The Committee could not see its way clear to make any payment, and I was therefore reluctantly compelled to cease broadcasting the information.

"The cost of running a high-power radio station like 4QG is very high, and it should be definitely understood that in asking the Committee of Direction to pay a certain sum per annum, the object was not exactly *to charge* the Committee, but rather to expect the Committee to contribute at least *a portion* of the necessary expenditure for the provision of information to the people *for whom the Committee exists to cater.*

"Station 4QG is certainly a public utility, but it must be conducted along sound financial lines. In the case of every public utility, those patronising must be prepared to pay costs of maintenance.

"Now that I have explained the facts of the case, I am sure you will realise that the blame does not lie with Station 4QG.

"I would suggest that you communicate with the Committee of Direction urging that the matter is important enough to warrant further consideration being given to it."

SHEEP ON THE FARM.

The editor of this Journal in the course of a recent visit to South Australia had an opportunity, through the courtesy of officers of the Department of Agriculture in that State, of observing the practical work of the South Australian Agricultural Bureau. At each meeting of branches of the Bureau, which is a State-wide organisation officially recognised, members who are practical local farmers submit papers on farm problems and practice for general discussion. At a recent branch meeting a paper was read by Mr. Michael, a well-known sheep man, on the value of sheep on the farm.

No farm, he said, was being put to its best use unless it provided for a flock of sheep. On a mixed farm there was no line that would bring such a good

return for the labour expended as would sheep. Sheep were particularly to be recommended on the one-man farm, because of the comparatively little attention they required. Most of the work in connection with sheep could be done during slack periods, whereas in the case of dairy cows or pigs those animals had to be attended to every morning and evening. He maintained that on a farm of from 500 acres to 600 acres, with 250 acres in crop and 150 acres to 200 acres of fallow, a flock of at least 200 ewes could be kept, in addition to a few dairy cows and the horses necessary for working the farm. In the first place, it would be essential for the farm to be well subdivided. Fifty or sixty acre paddocks were large enough. With small paddocks the sheep could be frequently moved about, and thus get the maximum nourishment from the feed. He advised stocking with well-bred merino ewes with large frames. This gave the farmer the opportunity to breed either crossbred or pure merino lambs. If the locality were one where reasonably early feed could be grown, he favoured the crossbred. Fat lambs, which could be marketed in July or August, would invariably bring high prices. He had had good results by using English Leicester rams, having the lambs dropped in February or March, and topping them off for market in July on oats or barley sown on stubble land. If the farmer went in for breeding crossbreds he would have to purchase ewes to maintain his flock, whereas if he kept to the pure merino his own ewe lambs would maintain the flock, and by the use of good rams he would be able to continually improve his flock. In a late district some hand-feeding would be necessary, and with high and increasing land values the hand-feeding of sheep paid handsomely. Mr. Michael considered 1 lb. of good hay chaff and ¼ lb. of oats per sheep per day were sufficient to keep a ewe in good condition, provided feeding was commenced before all the roughage was done and whilst the ewe was still in good condition. In the average season not more than six to eight weeks' feeding would be required. If the farm had been well worked, and was free from wild oats and weeds, it was necessary to sow fodder crops. Barley or oats sown on stubble provided an inexpensive fodder crop. A crop of oats or barley (oats especially) could be grazed until the middle of September, and if left for reaping would return sufficient to pay the expenses incurred and provide fodder for next year's hand-feeding. Pea crops were giving good results in many districts. If the ewes were lambing during the hand-feeding period it was advisable to keep them in small paddocks (the smaller the better) until the lambs were about ten days old, because there was a danger of a ewe racing to the feeding trough and leaving the lamb behind. He had worked out in the following table what he considered to be the income which could be expected from an established flock of 200 ewes by a farmer breeding merinos. He had taken the lambing time as April and May, and selling the lambs in November, with the exception of 50 ewe lambs reserved to maintain the flock:—

INCOME.

	£	s.	d.
Wool—			
200 ewes at 12s. 6d. per head	125	0	0
50 ewe hoggets at 12s. 6d. per head	31	5	0
5 rams at 15s. per head	3	15	0
150 lambs at 4s. per head	30	0	0
Sheep sold—			
50 4½-year ewes at 17s. 6d. per head	43	15	0
100 lambs at 15s. per head	75	0	0
Total income	£308	15	0

EXPENSES.

	£	s.	d.
Shearing 400 ewes and lambs and 5 rams at £2 per 100	8	4	0
60 days' hand-feeding at 1 lb. chaff and ¼ lb. oats per day for 250 sheep—			
7 tons hay chaff at £3 per ton	21	0	0
100 bushels oats at 3s. per bushel	15	0	0
Purchase of 1 ram	7	7	0
Total expenses	51	11	0
Net income	257	4	0

THE VALUE OF POSTMORTEM EXAMINATION IN DETECTING DISEASES AND DISORDERS IN POULTRY.

By P. RUMBALL, Instructor in Poultry Raising.

It is well at the outset to point out that the writer does not recommend as a general practice the treatment of poultry for sickness. At the same time, it is of considerable advantage to the general breeder to have a working knowledge of diseases to enable him to prevent or combat the outbreaks.

There are many diseases which cannot with any degree of certainty be correctly diagnosed while the bird is still alive. By most breeders dead birds are either burnt or buried immediately they are found, and the early evidence of possibly a serious outbreak of troubles is lost.

The practice of burning or burying dead bodies is not discounted by the above remarks, but all diseases of a bacterial or highly contagious nature have a small beginning, many spreading per medium of the droppings, and the fact of having burnt or buried a diseased bird has not eliminated the possibility of further losses, but it has withheld information which if it had been available may have been responsible for earlier measures being taken for the prevention of further trouble.

Apart from actual diseased conditions being disclosed, there is the more or less physical aspect to be considered, such as the general conditions of the internal organs due to feeding, and also as a means of definitely determining to what extent internal parasites are present.

There are many methods of making a postmortem examination, but the system outlined in this article is both simple and effective. Even by examination it will be somewhat difficult to make a definite pronouncement as to the cause of death, but all poultry keepers should have by actual experience in dressing healthy stock a fair knowledge of what healthy organs are like, and by the constant examination of birds that die on their farms become more efficient.

The lines suggested to open a bird are—first with a sharp knife slit the skin between the legs and abdominal walls; this allows the hip joint to be easily dislocated, the legs bent at right angles causing the bird to lay fairly firmly upon its back as shown in Fig. 1. Then with a pair of scissors cut the skin from leg to leg, bearing around in a circular fashion, getting as close to the vent as possible. Next tear the skin off right up to the head as in Fig. 2. This removes all the feathers, and in opening abdomen particles of feathers are not obstructing examination.

Fig. 3 shows the bird with the breastbone completely removed, exposing the internal organs in their natural position. This is done by cutting around the abdominal wall as close to the back as possible and right through the bones. To do this work a good pair of curved scissors having a ball point are an advantage, but failing these the work can be performed with ordinary scissors or a pair of tin snips such as most poultry breeders possess.

Explanation of Fig. 4.

1, Esophagus; 2, crop; 3, proventriculus or stomach; 4, gizzard; 5, duodenum; 6, intestines; 7, cæca; 8, cloaca; 9, vent; 10, egg in oviduct; 11, oviduct; 12, kidney; 13, ovary; 14, lung; 15, heart; 16, trachea; 17, liver; 18, spleen; 19, gall; 20, developed egg yolk.

Having the internal organs exposed, the next stage is to commence on their examination. In their present position the liver is the most prominent organ, and an organ of considerable importance. It is this organ which prepares the bile, one of the principal digestive juices, and it also assists in some of the necessary chemical changes of the blood. It contains many blood vessels, and is particularly subject to the attacks of parasites, which are carried there per medium of the blood stream.

Among the principal abnormalities found in this organ is its enlargement. This enlargement may be due to many infectious diseases, such as tuberculosis, fowl cholera, hepatitis, &c., and in these cases the liver is generally of a spotted appearance, due to dead tissue; but possibly the greatest cause of liver enlargement is due to the lack of exercise combined with improper feeding, or from the feeding of mouldy or putrifying foods. The excessive feeding of protein foods is merely indicated by a blueish grey streakiness; while yellow streakiness is generally an indication of a fatty condition which frequently results in internal hemorrhage. The latter trouble is frequently met with in heavy breed varieties of poultry which are confined and fed on stimulating foods. They are by nature lazy or inactive, thereby laying on surplus condition.

To proceed with the examination sever the gizzard from the proventriculus. The gizzard and intestines are then easily separated from their attachment and readily drawn out for examination. The chief thing to look for in the intestines is

PLATE 85 (Fig. 1).—FIRST STAGE OF POSTMORTEM.

Plate 86 (Fig. 2).—Second Stage in Making Postmortem.

inflammation. This inflammation may be due to worms of all descriptions, the feeding of mouldy or putrifying foods, foods containing excessive quantities of fibrous matter (especially when fed to young chickens), poisons and infectious bacterial diseases. However, in Queensland, most losses by diseases of a bacterial nature occur among young chickens. This is undoubtedly due to the confined conditions under which they are reared. The cæca when distended and filled with pus and particles of blood indicate bacterial trouble, while if trouble is caused through feeding fibrous or poisonous foods blood only is generally present. Worms of various species will be found in the cæca, intestines, gizzard, proventriculus, and crop, causing inflammation of the various parts if infestation is severe, consequently heavy losses.

The gizzard acting as a grinding organ breaks down grain and hard foods, preparing them for the digestive juices. If grit is not supplied to assist in the grinding process indigestion is likely to occur. This organ is subject to attacks of a special class of worm, the presence of which is only known by postmortem. Following up the digestive track the proventriculus or glandular stomach is met. The walls of the organ are of considerable thickness and its capacity slight, being fed gradually by the crop. In the walls of this organ are glands which secrete juices for the digestion of the albumenoids. This organ is subject to inflammation, due to improper digestion of food. If the gizzard is not functioning as rapidly as it should, due to the lack of grit or presence of worms, the stomach becomes unduly distended, and the contents being retained too long cause an irritation. Impure drinking water, ingestion of too large a quantity of food, inferior and improper foods, and similar substance would also be responsible for trouble. The crop, acting as a reservoir, as it were, for foods, is subject to the irritating effect of incorrect feeding, which causes a catarrhal condition or inflammation. The withholding of water, food, or grit for some considerable time induces the bird to gorge, with the consequence of the crop becoming distended and the muscular coat partially paralysed. The crop is also subject to impaction, due to the bird swallowing long grass, feathers, &c., but postmortem is not essential to diagnose this trouble.

The spleen lies to the right of the proventriculus and gizzard. Its colour is reddish brown, and in form is generally rounded. This organ in common with the liver is liable to infection with tuberculosis.

The reproductive organs of the hen consist of an ovary where the ovums or egg yolks are formed, and the oviduct where the yolk is encased in the various layers of albumen, and finally the shell. They are both very vascular organs and subject to congestion due to errors in feeding, as well as to many disorders which may be classed as physical disorders. Physical or structural disorders are of interest only, and are in no way of an epizootic nature. Inflammation of the oviduct and ovary, due to the prolonged feeding of food of a highly nitrogenous nature, have to the writer's knowledge been responsible for exceptionally heavy losses among leghorn hens. No other treatment than mild purgatives and a change of diet is of any value.

Kidneys and Ureters.—The bird has two kidneys and two ureters. The kidney is divided into three distinct lobes each connected with the ureter. They commence from the rear of the reproductive organs, continuing one on each side of the spine to the rectum. They are elongated in shape, fitting themselves into the irregularities of the bony structure of the bird. The ureters continue along the surface of the kidney, ending in the lower portion of the cloaca. The kidney is not an organ frequently affected with disease, but cases of abscesses have been reported, while the prolonged feeding of food excessively rich in protein causes whitish areas and a general paleness of the kidney.

The heart is affected with several troubles, dropsy of the heart sac being by far the most frequent. The trouble, however, is not of a serious nature in flocks receiving the ordinary amount of care and attention. Rupture of the heart or large blood vessels also occurs occasionally in birds over-exerted or in their effort to escape capture. The trachea right and left bronchial tubes and right and left lung forms the principal parts of the respiratory system. Many of the troubles affecting these organs can be determined without postmortem examination, while congestion of the lungs, a trouble frequently effecting young birds and birds during the moulty period, is readily diagnosed by examination. With this trouble the engorgement of the blood vessels causes pressure upon the air cells, resulting in death from asphyxia, or there may be a rupture of a blood vessel which blocks up the bronchial tubes. Pneumonia is a stage beyond congestion, as well as congestion a liquid collects which by coagulating makes the lung more or less solid, rendering it useless as an organ of respiration. Another trouble is the development of a mould fungi which is present in musty straw and grain. This fungi develops very rapidly in warm weather. Presence of this trouble is indicated by tubercular-like nodules varying in size from a pinhead to that of a pea in the tissue and even in the bones. On the

Plate 87 (Fig. 3).—Third Stage, which Exposes Internal Organs.

PLATE 88 (Fig. 4).—INTERNAL ORGANS OF HEN.

lining of the air tubes a membraneous formation an eighth of an inch in thickness may be found. These patches are at first soft, but become firmer with age and yellowish in colour. The lungs of poultry in common with other internal organs are subject to general tuberculosis, but it has not been the writer's experience to encounter any case where the lung has been affected.

Peritonitis, inflammation of the peritoneum, the delicate membrane covering the abdominal cavity and the organs in that cavity, is another frequent cause of death. It is generally due to disorders of the liver, kidneys, or perforations of the intestines caused by worms allowing the escape of some of the intestinal content, or it may be caused through the septic condition arising from severe bruises or body blows.

From postmortem, therefore, a definite knowledge of the reason of losses can be secured which enable the breeder to take timely steps to prevent diseases of an epizootic nature from spreading. If the trouble be due to errors in feeding and housing have them rectified. Although poultry-keepers will not admit that the conditions under which they keep their fowls are responsible, they are in the main the predisposing cause for outbreaks of sickness. An ill-nourished, badly-housed, or wormy-infested flock offer little resistance to the inroads of disease organism. Once an outbreak of disease of an epizootic nature has occurred, a thorough clean-up of the premises should be made and disinfection practised. The runs should be ploughed in order to bury the excreta and parasites and bring fresh soil to the surface, but previous to ploughing, if it is possible to keep birds out of the pens, it could be dressed with a good coating of lime. Birds which are apparently sick should be either destroyed or isolated, and a careful watch kept upon the balance of the stock.

POINTS IN SEED MAIZE SELECTION.

Improvement in yield and quality can be brought about by seed selection. High yields are obtainable by breeding from prolific strains.

Strong, healthy, vigorous plants should be chosen to bear seed and should not have more than two well-developed ears.

Selection should commence in the field, where the characteristics of each plant can be observed.

Plants which bear ears low down on the stem withstand heavy winds, and do not heel over readily when the soil is soaked with moisture; harvesting is simplified.

Ears which turn down as they ripen, and are covered with a fine-textured husk, are not readily damaged by birds or insects.

Seed ears should be uniform in size, shape, and colour, according to variety.

Cylindrical ears produce a more uniform sample of grain. Allowance must be made in this respect according to the characteristic shape common to different varieties.

Wedge-shaped grains having straight sides and edges fit together so compactly that little or no space is wasted; common to ears with sixteen to twenty rows.

By increasing the depth of grain in proportion to the diameter of the cob the shelling percentage of grain is increased.

Grains possessing a large embryo or germ have a relatively high oil and protein content; they give a stronger germination and are more nutritious.

Ears with straight, regular rows with firmly attached grain carry more grain of uniform quality than ears of the same size with twisted or irregular rows with loosely attached grain.

Wide spaces between rows and consequent loss of space causes a reduction in yield per ear.

Ears fully and firmly covered by the husk protects the silks and, later on, the grain from weather and insect attacks. Husk covering should be close-fitting and fine-textured.

Fine piths or cores dry out much better and are usually associated with deep, plump grain. Coarse piths dry out slowly and usually indicate shallow grain and coarse stalks.

In very moist districts hard grain showing a high proportion of horny starch should be selected in preference to softer and more starchy kinds, which are readily subject to insect attack and mould.

C. McKEON, Assistant Instructor in Agriculture.

BIOLOGICAL CONTROL OF INSECT PESTS.

ADDRESS BY PROFESSOR E. J. GODDARD, B.A., D.Sc.

The results achieved in the sphere of biological control were reviewed interestingly by Professor E. J. Goddard, B.A., D.Sc., in his presidential address at the annual meeting of the Entomological Society of Queensland, held at the Queensland University of 16th March. The results achieved in different parts of the earth, he said, pointed to the necessity for intensive ecological entomological work, and appreciation of the fact by all members of the community that, with alarming suddenness, apparently useless entomological scientific work might assume a grand economic status.

Broad Basis of Research.

Professor Goddard, whose subject was "Biological Control by Insects," pointed out that recent developments within the State of Queensland, as instanced by the institution of a Faculty of Agriculture at the University, and the great interest manifest throughout the Commonwealth in entomological problems, as illustrated by the appointment of competent entomologists by the Commonwealth Council of Scientific and Industrial Research, all pointed the way to the necessity for planning the needs of the country and elaborating entomological research of an economic nature on a broad basis. The scope of economic entomology embraced a study of the structure and life histories of injurious insects, and their relations to all the natural and artificial conditions to which they might be subjected. It included also the investigation of the nature of the losses engendered by such insects and the practicable means by which they might be prevented or lessened. The great variety of insect forms, their diverse methods of food habits, the large number of hosts which supplied them with food, and the enemies which tended to destroy them—all these made it evident that the problem of insect control was most complex. The control of insect pests had become a most important matter, and if only a portion of the loss which insects caused could be prevented the work of investigators would be well repaid. In a general way the methods of control of insect pests might be differentiated into normal methods, artificial methods, and biological methods. The first of these included hand-picking of certain insects, collection of eggs, cleaning up rubbish and weeds, planting early or planting late, rotating crops, using resistant varieties, ploughing at certain seasons of the year, utilisation of some mechanical impediment, traps, &c. Artificial methods consisted mainly in the use of insecticides.

Chemical Line of Attack.

Professor Goddard dealt at length with the great advance made in this—a chemical line of attack—during the past twenty-five years. Incidentally he referred to the utilisation of waste products for the elaboration of insecticides, and the commercial use of aeroplanes for the purpose of spraying or dusting crops covering an extensive area. Yet there were many insect problems for which normal and artificial methods of control appeared to offer no solution. It was in such cases that recourse must be had to Nature's help, and the aid of some biological method of control sought. The forces of Nature, if left to themselves, tended towards a state of equilibrium or to maintain a condition of balance; no one plant or animal was able to maintain an ascendency over others for any long period of time. If an insect increased abnormally for a period of years, certain natural forces, such as climatic conditions, parasitic and predaceous insects, birds and fungus diseases, attacked it from all quarters, and reduced it to its normal numbers. Knowledge of these facts had led to the idea of appropriating some of these natural agencies and using them to check the abnormal increase of certain insect pests, to reduce them to normal numbers, and to suppress their ravages. This constitutes the biological method of control. Professor Goddard dealt in detail with successful efforts of biological control, such as the cottony-cushion scale (imported into California from Australia), by a ladybird imported from Australia; suppression of a leafhopper (which found its way from Australia to Hawaii, and did much damage to sugar-cane) by a parasite imported from Australia; control of citrous white-flies by a fungus (Aschersonia); control of gypsy and brown-tail moths in America by parasites imported

from Europe and Japan. He paid special attention to the efforts at biological control in New Zealand, such as woolly aphis by *Aphelinus mali;* pear leaf curling midge, earwig, oak scale, pear slug, and aphides by respective parasites. Professor Goddard eulogised the work accomplished by Mr. G. H. Hardy, Walter and Eliza Hall Fellow, University of Queensland, in elaborating means of successfully breeding parasites of the sheep blow-fly. He also referred to the successful biological control of the coconut moth of Fiji by an imported parasite. The utilisation of insects for destroying prickly-pear, blackberry, lantana, &c., was discussed, and the opinion proffered that some other noxious weeds would ultimately be destroyed by the employment of these means.

Professor Goddard indicated the great advantages of biological control by stating that artificial and normal methods of control demanded annual repetition, faithful discharge of recommendations by all agriculturists at the right season of the year, and continuous expenditure. Biological control was cheap and permanent. While much could still be anticipated in the use of chemicals, it was the duty of the economic entomologist to-day to leave no avenue unexplored in attempting to establish biological control of insect pests.

METHYLENE BLUE REDUCTION TEST.

ITS VALUE IN MILK GRADING.

C. McGRATH, Supervisor of Dairying.

The methylene blue reduction test, as a quick method for determining approximately the number of bacteria present in a sample of milk, is recommended to graders at cheese factories and milk-receiving stations.

The process is not as accurate as the plate culture or the more recent direct microscopic count methods.

The latter tests, however, are more complicated and expensive, and call for special training and more skill than in carrying out the methylene blue reduction test.

A comparison of the results of grading milk by the direct microscopic count and the methylene blue reduction determination has proved that the latter test can be used with advantage where milk is received for human consumption or manufacturing purposes.

The methylene blue reduction test is of special value for the grading of milk received at cheese factories, as a fermentation test can be made on the same sample of milk, after the colour reduction time has been recorded.

It is not suggested that this test would take the place of the usual inspection and grading of the milk which must always be carried out by a qualified milk-grader.

No technical description of milk and no test at present known can replace the practical knowledge obtained by experience in the grading of milk and its products.

Descriptions of odours and flavour of milk and its products, in terms definite enough to guide an inexperienced grader, have been found to be impossible.

The methylene blue reduction test can be made when the grader decides that it will aid him in determining the quality of milk.

The test, however, should be applied to each milk supply a few times each month, and by averaging the reduction time results the work of the grader becomes of greater value.

When the test has been in operation for some time, the average quality of each patron's milk can be more definitely determined.

Attention can be given to improve the quality of the milk below first grade.

In classing the milk delivered at a cheese factory, the grader will readily discern the night's milk from the morning supply.

A pleasant, clean, partially-ripened flavour of the milk held overnight indicates that the milk has been produced under sanitary conditions, and the desirable lactic acid micro-organisms predominate.

The clean, pleasant, fresh smell and flavour of the morning's milk is indicative of the conditions under which the milk is produced, handled, and delivered at the factory.

To produce a first-grade milk having a low acidity and bacterial count and free from excess sediment requires care and attention on the part of the producer

and is a more expensive operation than the production of milk of a lower grade. High-grade milk and its products increase consumption and raise the price of such products with benefit to all engaged in the industry.

Producers of first-quality dairy products should be paid a substantial premium. Low-grade dairy products decrease consumption and lower the price for high-grade products.

The Test.

It has been determined that when a definite amount of methylene blue has been added to a sample of milk and a temperature of 98 deg. Fah. is maintained, that decolouration occurs at a rate determinable by the number of bacteria present.

Milk which contains several million bacteria per cubic centimetre will be decoloured in a few minutes, while milk which contains a few thousand bacteria per cubic centimetre will retain the blue colour for several hours.

The decolouration is dependent upon the amount and rapidity of acid produced by the activity of the bacteria in the milk samples.

To carry out the methylene blue reduction test only a small amount of apparatus is required, and consists of—

Glass test tubes, 6 x ¾ in.;
Rack for holding same;
Water bath to maintain temperature of samples;
120 c.c. milk pipette.

Stock solution of methylene blue is made by dissolving 1.1 grams dry methylene blue dye in 500 c.c. of distilled water.

The dilute solution for use is made, as required, by adding 39 c.c. of distilled water to 1 c.c. of methylene blue stock solution. This dilution will keep three days, and gaves one part of dry crystalline blue in 200,000 parts of the milk sample tested.

Procedure.—Mix the milk thoroughly before drawing off the sample.

Pipette 20 c.c. of the milk with a sterile test tube, add 2 c.c. of dilate methylene blue. Mix thoroughly, and close with a cotton plug. Place the test tubes in a bath and keep at a temperature of 98 to 100 deg. Fah. Observe the change in the colour of the milk at intervals.

By comparing the tests milk samples with a quantity of normal milk the time of disappearance of the blue colouration can be fixed.

The grade of the milk is determined by the rapidity with which the blue colour disappears.

The following time records the standard according to Hunziker:—

Time decolouration.	Quality milk.
2 hours	Poor
2 to 5½ hours	Fair
Over 5½ hours	Good

Methylene blue test and its relation to bacterial content of tested milk, according

Time decolouration.	Classification.	App. number of bacteria per c.c.
Less than 20 minutes	Poor	20 millions
20 minutes to 2 hours	Medium	4 to 20 millions
2 hours to 6 hours	Fair	½ to 4 millions
6 hours or over	Good	Less than ½ million

Sterilise test tube pipette by boiling for 20 minutes before use.

Close test tubes with plug of cotton when in rack awaiting use, and insert cotton plug as soon as sample of milk is delivered into same, and keep closed during the period of the test.

Rinse the pipette with boiled water after sampling each supply.

The stock solution will keep for six months.

The dilute solution to be added to the samples of milk will keep three days.

The methylene blue reduction test will assist the grader to divide the milk supply into several grades. A low bacterial count is indicative of sanitary production and handling of the milk.

The age and local climatic conditions, together with the milk grader's practical experience, enable him to assess the value of the test which can be used in cheese factories and milk receiving stations with advantage.

RURAL PROBLEMS.

CONFERENCE OF LOCKYER FARMERS.

There was a representative attendance of delegates from the several branches of the Local Producers' Associations in the Lockyer at the Queensland Agricultural College and High School on 22nd March, for the annual conference. Mr. W. A. Fielding presided, and extended congratulations on behalf of the conference to Mr. J. K. Murray on his appointment as the first Professor of the Faculty of Agriculture at the Queensland University.

Price-Fixing Board for Pigs.

There was a long discussion on the question of forming a Price-Fixing Board in connection with the pig industry, it being contended that the producer should have some knowledge as to how the price paid for pigs was arrived at. General disappointment was expressed at the failure of the Murarrie and the Downs Co-operative Bacon Companies to formulate some scheme of amalgamation. It was finally decided that the appointment of a committee to go into the question of price-fixing of pigs should be deferred, and that the directors of the co-operative bacon factories should be invited to attend the next meeting to give first-hand information.

Milk Transport.

Mr. L. H. Paten, of Calvert, brought forward the matter of the inconvenient train arrangements for the farmers who supplied whole milk to Brisbane from Grandchester down. They were at a disadvantage compared with suppliers on the other side of Brisbane. If they could get one of the rail motors it would overcome the difficulty. The conference gave its wholehearted support to the matter and appointed Mr. Paten its representative on any deputation appointed to wait on the authorities concerned.

An Irrigation Project.

The secretary read a report from Mr. C. Harland, of the Irrigation Commission, on the possibilities of irrigation in the Lockyer Valley. This matter, the delegates thought, was of the utmost importance. Messrs. J. Logan (Gatton), L. Raymond (Lockrose), and K. Jamieson (Tent Hill) were appointed a delegation to wait on the Acting Premier and urge that a weir should be put across the Lockyer at some suitable spot as an experiment.

Fodder Conservation.

The question of the conservation of fodder was exhaustively discussed. No finality was reached, but a motion, moved by Mr. T. Hayes (Laidley), was carried—"That the conference expresses its adherence to the principle of fodder conservation, and that the details of a scheme be formulated for the conference in June."

It was decided to invite the Acting Premier (Hon. W. Forgan Smith) to be present at the conference in June.

Price of Millet.

The Lower Tent Hill L.P.A. asked how it was that when the price of millet was fixed at £56 per ton, and the levy at 2s. 6d. per cwt., growers could obtain only £50 per ton on the open market, yet they were compelled to pay the levy when no assistance was rendered by the Board in obtaining the fixed price? It was decided to obtain information on this matter through the Council of Agriculture.

Address by Professor Murray.

Professor J. K. Murray (Principal of the College) addressed the conference on the problems confronting agriculture. They required more efficient crops and more efficient stock. Every dairy herd in the State could be improved. The qualities and values of the various crops were outlined by him, and advice given as to what varieties of seed to plant. The secondary industries connected with agriculture were dealt with, manufacturing, storage, sales, service, and transportation being reviewed. Speaking on the spirit of co-operation, Professor Murray thought a broader view would benefit the various industries. Taking the pig industry as an example, it was not a question whether the Downs or the Murarrie factory wanted support, but where could the pigs be treated best in the State in the interests of the industry. He believed the railways could do more to assist our primary industries than was being done at present. Good butter was produced from good cream, and one of the most important things with cream was a better means of transport.

Some national insurance policy was needed in connection with droughts. There was no reason why Queensland could not meet its own problems. Speaking on the Faculty of Agriculture, he said he appreciated the honour that had been conferred on him. It was the first of its kind in Australia, and he liked it because it linked up the University with the College and the Department of Agriculture, and with the three pulling together we should get better results for agriculture in Queensland. No Faculty of Agriculture, however well equipped and staffed, could turn out first-class men unless it was provided with students who were able and possessed of common sense.

VANISHING BIRD LIFE.*

Native wild-life is slowly, but surely, vanishing from our midst, and will continue to do so under existing conditions. The game laws of the different States vary one from the other, and should be under one department. For instance, ducks can be shot in New South Wales earlier than in Victoria, and we make the Murray River the boundary, whereas the ducks recognise no boundary. Take the last opening of the duck-shooting season in New South Wales. Many hundreds of ducks were nesting, or had young broods, as the season was slightly later than usual, and men who went out shooting saw nearly as many flappers as adult birds. So that hundreds of young ducks must have perished through the parents having been shot; to say nothing of the unhatched eggs left to grow cold.

Our natural resorts for wild-fowl, quail, pigeons, and other species are gradually becoming less as the country is opened up and cleared, and swamps drained. Then again, in spite of the close season, many birds are shot in the country districts. The birds also have foxes and domesticated cats gone wild to contend with, as well as the usual birds of prey. As so much of the natural cover has been done away with, the birds are now much more confined to restricted localities than they formerly were, and, therefore, fall an easier prey to their enemies. Again, poison laid for rabbits has accounted for the death of very many birds, but that cause of death can be much reduced by laying the rabbit poison carefully and covering it, and by not using grain.

The Value of Birds.

As birds are of such great value to our State—far more than we can realise—we should do all in our power to protect them. The wild birds do not belong to us to treat as we like. Go where one will in Victoria, the same story is heard, that is the diminution of ducks, quail, snipe, and the other sporting birds, as well as those that are not used for food. and are strictly insectivorous. We have to use all kinds of poison to destroy the insect pests which often infest our fruit and other trees, and this is work that the birds should largely do for us. Thousands of birds are shot in cherry and other orchards when the fruit is ripe. When forming his orchard, the orchardist could erect a light framework over his trees, and when the fruit was ripe, hang netting over the trees, and so protect them from the birds. When the fruit was gathered the netting could be rolled up until next year. The first cost would be the last cost; the fruit would be protected, and the exceedingly useful birds would have the free run of the trees for the rest of the year. This would be far more effective and cheaper in the end than shooting the birds when on the fruit trees, as the shot generally injures the fruit and branches, as well as killing the birds.

Birds a National Asset.

We should recognise the birds as a national asset, and do all in our power to preserve them, and let them have as many sanctuaries as possible. Portions of our State, which are set apart as forest or other reserves, should be proclaimed "Bird Sanctuaries," and should be jealously guarded from deletion; they are also a national asset, and increase in value as time goes on. It is only right that we should leave some of our country as we found it, so that it may be enjoyed by our children's children, and that they, too, may see the wonderfully interesting and useful fauna that their forefathers saw.

To make a calculation as to the number of injurious insects destroyed in one year is impossible; they would number billions. The value of fruit, grain, vegetables, grass, forests, &c., saved for our farmers by the destruction of these insects by

---

* Reprinted from the "Graziers' Review" (Q.), 16th March, 1927.

birds is also beyond computation. A most valuable work on this subject has lately been written by Dr. W. T. Hornaday, of New York. It is entitled "Vanishing Wild Life," and applies to America mostly, but what applies to that country does so equally to our own. In this book Dr. Hornaday states:—

"It is undeniable that the welfare and happiness of our own and all future generations are at stake in this battle for the preservation of Nature against the selfishness, ignorance, and cruelty of her destroyers. We no longer destroy great works of art; they are treasured and regarded as of peculiar value; but we have got to attain to the state of civilisation where the destruction of the glorious work of nature, whether it be cliff, forest, fern-tree gully, giant trees, or a species of mammal or bird is regarded with equal abhorrence. The whole earth is a poorer place to live in when a colony of exquisite egrets, or birds of Paradise, is destroyed in order that plumes may decorate the hat of some lady of fashion, and ultimately find their way into the rubbish heap. Our game does not belong exclusively to the men who kill; the other 97 per cent. of the people have vested rights in it, far exceeding those of the 3 per cent. who kill. Posterity also has claim upon it that no honest man can ignore. I am now asking the true sportsman, and people who do not kill wild things, to awake and do their plain duty in protecting and preserving the game and other wild life which belongs partly to us, but chiefly to those who come after us.

"A continent without wild life is like a forest with no leaves on the trees. At present it seems that the only remedy lies in Federal protection of all migratory birds, because some of the States will not do their duty. For educated, civilised man to exterminate a valuable wild species of living thing is a crime, both against his own children and posterity. No man has any right, either moral or legal, to destroy or squander an inheritance of his children that he holds for them in trust. Man has not created even the humblest of the species of birds, mammals, or fish that adorn and enrich this earth.

"The earth is the Lord's and the fulness thereof." To-day the civilised women of the world are directly promoting the extermination of scores of beautiful species of birds by the devilish persistence with which they buy and wear further ornaments made of their plumage. They are just as mean and cruel as a truck-driver who drives a horse with a sore shoulder. Our object should be—

First—To save valuable species from extermination.

Second—To preserve a satisfactory representation of our once rich fauna, to hand down to posterity.

Third—To protect the farmer and fruitgrower from the enormous losses that the destruction of our insectivorous and rodent-eating birds is now inflicting upon both the producer and the consumer.

Fourth—To protect our forests, by protecting the birds that keep down the myriads of insects that are destructive to trees and shrubs.

Fifth—To preserve to the future sportsmen enough game and fish that they may have, at least, a taste of the legitimate pursuit of game in the open that has made life so interesting to the sportsmen of to-day."—Dudley Le Souef, Melbourne.

FARMERS APPRECIATE THE JOURNAL.

The following excerpts are typical of quite a number of references to the usefulness of the Journal by farmers in correspondence with the Department in the course of the month:—

A Stanthorpe subscriber writes: "I would like to state that I find your Journal intensely interesting and of inestimable value to anyone interested in Agriculture, or in any of the many branches of that science."

A North Coast farmer endorses previous appreciative references to the Journal by fellow farmers, and adds, "No farmer with any pretensions of being business-like is, or should be, without it."

Answers to Correspondents.

A Stock Lick.

J.H.F. (Texas, Q.)—

A copy of "Stock Foods," has gone forward. The "Journal" for March, 1925, is, we regret, unavailable.

Your inquiry concerning sheep lick was referred to the Agricultural Chemist, Mr. J. C. Brunnich, who advises as follows:—

It is a mistake to give too much salt in a lick, and only a sufficient amounts of salt are necessary to make licks more palatable.

Nauru phosphate is practically lime or calcium phosphate containing also some lime carbonate.

Sterilised fine bone meal, if obtainable, may be more palatable and more easily digested than Nauru phosphate.

I recommend a lick made as follows:—

20 parts of salt,
40 parts of sterilised bone meal or finely crushed Nauru phosphate,
40 parts of finely crushed lime carbonate,
1 part of iron sulphate.

It is optional to moisten this lick with about 5 to 10 parts of molasses.

Extraction of Salt from Saline Water.

R.B. (Mareeba)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises as follows:—

No practicable method to remove salt from saline water or effluents exists. Any such water, even after being treated to remove the organic matters to prevent putrefying decomposition, will still contain the salt and be a menace to all vegetation.

Destruction of Khaki Weed.

J.W. (Thane, Inglewood Line)—

Your inquiry concerning the destruction of Khaki Weed was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises as follows:—

A heavy dressing with coarse salt (waste salt from butcher shops and hide stores) will effectually destroy khaki weed. The salt will make the soil barren for a short period, until heavy rain washes the salt out.

A Complete Fertiliser.

C.O.N. (Montville)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises:—

A mixture of—

Bone Dust	54 parts
Sodium Nitrate	22 parts
Potassium Sulphate	17 parts
Sand	5 parts

will make a complete fertiliser, 5.13.8.

BOTANY.

Following are selected replies by the Government Botanist, Mr. C. T. White, F.L.S., to correspondents in the course of the month:—

"Bamboo Grass."

D.L. (Canungra)—

The specimen is *Stipa micrantha*, sometimes known as "Bamboo Grass." It is more abundant on the Downs than on the coast, and in the former districts provides a bite for stock. It is, however, not a particularly valuable forage grass and hardly worthy of a place on the rich Beechmount Tableland, where better grasses can be grown.

Wampi—A Saltbush Variety.

A.H.B. (Townsville)—

The tree with the large leaves.—It is very difficult to name trees accurately from a single leaf. However, we think the specimen now sent represents the Wampi (*Clausena Wampi*), a small tree of the orange family, a native of China, but widely cultivated throughout the tropics and subtropics. The rather pleasantly flavoured sub-acid fruits are said to make excellent preserves, but seem to be little used here. We would like a few fruits to veritfy the determination.

The small creeping plant.—*Enchylæna tomentosa* var. *glabra.* A rather fleshy member of the saltbush family. We do not know a common name for it. The small red fruits were said to be eaten by the natives, but we have no very definite information about their properties.

"Christmas Tree" and "Bean Tree."

L.R.B. (Barrine, Kulara, N.Q.)—

It is very difficult to name specimens of trees from leaves only. Of the two the "Christmas Tree" is, we think, *Lagerstræmia flos-reginæ*, the "Crepe Myrtle." Several garden varieties of this tree are grown in Queensland. They bear large trusses of flowers with crinkled petals—red, white, or lavender. Send a few flowers or seed pods to verify.

The "Bean Tree" is *Castanospermum australe.* Local names are "Bean Tree," "Black Bean," and "Moreton Bay Chestnut." The wood is very beautiful cabinet wood, but is difficult to obtain sound in large sizes. It is also rather hard to work. The large chestnut-like seeds contain a poisonous saponin and cause severe gastro-enteritis in cattle and horses. The natives, however, eat them after grinding, washing, and cooking.

"Black Sally"—Maiden's Wattle—White Bloodwood.

T.A.P. (Toowoomba)—

1. *Acacia salicina.* Sometimes known as the "Black Sally." "Sally," as you probably know, is the vernacular applied to many wattles.
2. *Acacia Maidenii.* Maiden's Wattle. Reputed good forage for stock during times of drought.
3. *Eucalyptus trachyphloia.* White Bloodwood.

Black Mauritus Bean—Pig Weed—Fodder Grasses—Cultivated Fruits in Papua.

P.N.C. (Port Moresby, Papua)—

1. The bean is *Stizolobium aterrimum,* the Black Mauritius Bean. It is widely cultivated in some of the sugar-growing areas of Queensland as a green manure. It has not run out and become a pest so far, though it has been cultivated here for many years. It is widely cultivated throughout the tropical regions of the globe, but solely as a green manure and cover crop. The vines are never eaten by stock, and the seeds or pods never eaten raw or cooked by animals or man. We do not know that the properties of the bean have been investigated, therefore we cannot answer all your questions regarding its poisonous properties.
2. The weed is *Trianthema monogyna,* known in Queensland as "Giant Pig Weed," sometimes as "Hog Weed." It is widely distributed as a weed in cultivation over the tropical regions of the globe. Replying to your questions—(*a*) It is not a legume; (*b*) would make a cover crop of sorts but there are better things; (*c*) it is eaten by stock, but is neither particularly palatable nor nutritious.
3. The best fodder grass to grow on alluvial flats in Papua, we should say, is unquestionably *Panicum muticum*, the Para Grass. It is generally planted by cuttings of roots as it does not set much fertile seed. Guinea Grass is another grass that should do well in Papua. It would have to be kept cut regularly to prove palatable. Sudan Grass is worthy of a trial, but it would have to be treated as a field crop for cutting, not as permanent pasture.
4. We should say grapes were hardly worth bothering with in Papua—it is too wet during the fruiting season. They grow grapes quite well in parts of the Queensland Gulf country, but the summer rainfall is probably not quite as heavy as yours.
5. Peaches—some varieties of the China race—cultivated in Coastal Queensland might possibly grow and fruit. Figs, we should say, are not worth bothering about. Mulberries are worth a trial.

"Rattle-pod."

A.D. (Morayfield)—

The specimen is a species of "Rattle-pod" (*Crotalaria striata*). A pamphlet on the weed has been forwarded. Deaths of cattle on the Caboolture River some years back were traceable to this plant. So far as we have noticed, however, stock have got to be forced on to it by drought conditions; when there is plenty of feed about they leave it alone.

Seeds Required.

L.P.R. (Epping, N.S.W.)—

The seeds you ask for are not generally stocked by seedsmen, and you will have difficulty in getting supplies.

Pleiococca Wilcoxiana. This is very abundant on Fraser Island and is in full fruit in late May or early June. If you write the Officer in Charge, Forests Office, Fraser Island, via Maryborough, Queensland, he might send you a bag of fruits. It fruits very heavily some years.

Rhodosphæra rhodanthema. This is common in Queensland scrubs, and we often have seeds on hand. Next time we have any we will remember your request.

Hicksbeachia pinnatifolia. Not common in Queensland; much more abundant in the Northern Rivers District of New South Wales. Impossible, we should say, to supply.

"Red Bush Nut." Do not know to what you refer.

"Crow-Foot Grass"—"Button Grass."

P.D. (Yarwun)—

The larger specimen is *Eleusine indica*, "Crow-foot grass." This grass is widely distributed over the warmer regions of the globe. In Queensland it occurs mostly in cultivation paddocks, along headlands, around cow-yards, &c., or anywhere where the land has been broken. It provides a large amount of coarse forage, but should be fed on with care as, like Sorghum and some other plants, it contains a prussic acid-yielding glucoside and if fed on greedily by hungry stock may cause bloat and even death, though we have not been able to trace any deaths of stock in Queensland directly to this grass. It can be spoken of as an annual grass that comes up with the summer rains, though sometimes it lasts through more than one season. Though known commonly as "Crow-foot" it must not be confused with the herb on the Downs country that goes under this name.

The smaller grass is *Eleusine aristat*, the "Creeping" or "Perennial Button Grass." This grass is fairly common in North Queensland and extends to tropical Asia. It is quite a useful pasture grass though not, perhaps, of any special merit.

Euphorbia or "Caustic Creeper."

INQUIRER, (Hughenden)—

The specimens forwarded are species of Euphorbia and are allies of the "Caustic Creeper." A number of species of Euphorbia are suspected of poisoning stock. The specimens sent may be the cause of the poisoning of the sheep, as they are suspected poisonous plants. The sheep would be particularly susceptible to poisonous forage after being released from trucks, as they would presumably, have empty stomachs. The poisonous character of the "Caustic Creeper" (*Euphorbia Drummondii*) has been definitely established. One of the symptoms of poisoning by the "Caustic Creeper" is swelling of the neck.

Spermacoce Brachystema

J.B.S. (Nebo)—

The specimen submitted by Mr. Alan Shannon, which he reports is exported by Chinese in large quantities, is *Spermacoce brachystema*, a plant which is confined to Eastern Australia. Coumarin, an aromatic substance, which is used in perfumery, has been found in some species of *Spermacoce* and may be present in the species submitted.

Stanthorpe Plants Identified.

S. (Stanthorpe)—

The plant specimens forwarded through Mr. Hubert Jarvis are—

1. *Commelina cyanea.*
2. *Phyllanthus minutiflorus.*
3. *Trachymeme incisa.*
4. *Cynoglossum Drummindii.*
5. *Datura Stramonium.*
6. *Aneilema gramineum.*

No. 5, *Datura Stramonium,* is a poisonous plant. The seeds of this species are especially poisonous, a number of deaths of human beings having been traced to it. Analyses have shown that the seeds contain as much as 0.33 per cent. of atropine, a poisonous alkaloid. In the same analyses the leaves were found to contain 0.2 per cent. atropine. In cases of poisoning by it atropine causes paralysis.

VETERINARY.

Blight—Head Swelling in Cow.

P.M.R. (Mundubbera)—

Veterinary Surgeon J. A. Rudd, of the Stock Branch, advises:—

1. Cure for Blight—Try nitrate of silver, 5 grains; distilled water, 1 oz. Place a few drops into the eye of the animal with an eye dropper every day, or draw a camel-hair brush, moistened with the lotion, gently across the eyeball once every twenty-four hours.

2. Cow with Swelling—*Case:* A springing cow running with other stock. About a week before she was due to calve a swelling appeared under the jaw, which increased until it covered the jaws down to the mouth. She could not open her mouth to feed. The swelling extended down throat and brisket to a front leg. When rubbed it crackled as though there was a sort of jelly underneath the skin surface. Kerosene was applied and bathing with hot water and turps tried. When death was evident, the swelling was opened and much matter like dirty water was drained away. The swelling continued to extend and the cow died. *Answer:* The mouth was probably in a septic condition due to a wound, or a piece of bone or like substance was pressed in between the molar teeth, the ends of which were irritating the tongue and cheek bringing sepsis, or blood-poisoning. An examination should have been made of the mouth immediately. The swelling, which was soft and fluctuating, was opened at a point furthest from the obvious seat of trouble. Surgical interference in this way is hopeless if the condition is allowed to remain until it is apparent that the animal is on the point of death.

Nasal Fly in Sheep.

W.I.S. (Amby)—

The Instructor in Sheep and Wool, Mr. W. G. Brown, advises as follows:—

"Yes, I remember receiving specimens of Nasal Fly from your correspondent, and I still have them in the office.

"I regret to say that there is no known way of dealing with the pest, excepting in the early stages, when a teaspoonful of petrol squirted into the nostrils will kill them.

"The running at the nose is one of the surest symptoms. They usually fly, in Queensland, from August to December every year, and the grubs remain in the nostrils for seven or eight months. The Nasal Fly is now to be found all over Queensland. I have not seen any deaths, but hear of occasional sheep dying, and the owners attribute the mortality to the grubs.

I have never known bleeding at the nose to be caused by the grub. The grub itself does not attack the flesh of the nasal passages, but lives on the mucus. It is, of course, possible that the bleeding is caused by them.

"Bleeding may be caused by the inhalation of foreign matter in dry grass or chaff.

"Under separate cover is forwarded 'The Farmer's Sheep in Queensland,' in which is discussed the Nasal Fly."

Mortality Among Lambs.

A.J.B. (Kogan)—

Mr. W. G. Brown, Instructor in Sheep and Wool, advises:—

I note that your correspondent has had a few deaths amongst his four months old lambs. He says that there is no sign of worms, but that there is sand in the third and fourth stomachs. In the absence of worms this shows that there must be some irritant poison present. The congestion of the small intestines also point to some irritant being present. After a drought with heavy rain following, there are often poisonous herbs that spring up almost in a night. One of these, the "onion lily," is often very fatal. It grows on your correspondent's country, especially on the sandy lands.

I am pretty sure that the lambs have been eating some poisonous weed.

Sheep Shedding Wool.

D.J.E. (Dayboro')—

We are pleased to know that your sheep came through the heavy rains so well. You will learn that if sheep cannot stand hardship either under dry or wet conditions none of the other domesticated animals can either.

In regard to the small patches of wool coming away from the skin, the Instructor in Sheep and Wool, Mr. W. G. Brown, advises that this is a very common occurrence, and is usually caused by fevered conditions of the animals. Sometimes if sheep have been feeding on dry grass, or under drought conditions, a flush of green grass causes a new growth of wool, and just at the point where the conditions change, there is a break in the wool. There is no remedy as far as the wool is concerned. It will fall off if you do not pull it off, and the new growth will take its place. There is nothing to be alarmed at. In regard to the lameness, there is a gland between the toes of sheep which, if obstructed, leads to lameness until the obstruction be removed. Examine the feet of the lame sheep, and, taking a wooden sliver—an ordinary safety match will do—remove the mud or grass-seed and squeeze gently the joint of the foot. When a little pus or matter comes out the sheep will soon be relieved. Dress with a solution of bluestone and water, 2 lb. to 1 gallon, or the equivalent. In regard to the ram your neighbour lost, retention of the urine is a common occurrence, mostly caused by calculi or chalk stones. Some animals are peculiarly liable to this infection; others are never troubled. It is commonly known as gravel. The symptoms are known early. The animal is uneasy and constantly turning his head towards his flank, lying down, and then getting up again.

If your or your neighbours' sheep show these symptoms again, give a drench—2oz. saltpetre (nitre), 2 quarts water; dose 2 fluid ounces. That will help.

PIG RAISING.

Subjoined are replies to correspondents, selected because of their general interest, by the Instructor in Pig Raising, Mr. E. J. Shelton, in the course of the month:—

Evils of Early Weaning.

H. (Caboolture)—

It is evident that the pigs purchased by you were weaned too young, and had suffered such a setback by early weaning and sudden change of food that their digestive organs and bowels were not able to cope with the class of food given, and they gradually declined. This trouble is not uncommon and many thousands of pigs die annually as a result. Pigs should not be weaned before they are eight weeks old. In cases like this the strongest and best pigs last the longest, but stoppage of the bowels is fatal no matter what the food or housing may be like. We can only suggest more care and stricter attention to feeding of young animals to ensure that the bowels are free and that they assimilate the food given. We certainly think it would pay you to breed your own pigs, too, in preference to buying stores, for the latter are usually unsatisfactory.

Pie Melons for Pigs.

W.L. (Rockhampton)—

The feeding value of preserving melons for pigs is somewhat difficult to estimate, as so much depends upon the age and condition of the pigs. Very young pigs, for instance, would not benefit to the same extent as mature breeding sows and boars in serviceable condition. It is to the latter type (breeding sows and the boar) that we advise feeding melons in the raw state, together with pumpkins, root crops, greenstuff, grasses, and a limited proportion of grain. Very young pigs require food that is more concentrated and more readily assimilable, for their stomach is very small in comparison, and they will not thrive if fed on bulky foods carrying a very high percentage of water. On the other hand mature stock whose bodies are already built up and who require to be maintained in reasonable condition benefit very considerably by these bulky foods.

Jerusalem Artichokes as Pig Feed.

Inquirer (Brisbane)—

Jerusalem artichokes are useful for pig-feeding; in fact, they compare very well with all root crops and, though perhaps not quite so productive as sweet potatoes, they have the advantage that they are available during the winter months when there is usually a limited supply of green food available. They are particularly suited to feeding weaners and pigs in the store and porker stage. They are also appreciated by bacon pigs, breeding sows, and all grades of young and mature pigs. It is customary to plant them in a similar way to planting English potatoes, during August or September, in drills 3 feet 6 inches apart, placing the tubers 18 inches apart in the drills. The soil should be well cultivated, for artichokes occupy the ground for several years. Four to five cwt. of seed drilled per acre is necessary to properly seed the land, but we suggest planting a small patch and growing your own tubers for planting next year. Yields of 6 to 8 tons per acre are not uncommon in good seasons. The plant is of the sunflower type, the flower being similar to a miniature sunflower. The tops are of no value for stock feeding; they die off when the tubers are ripening. It is best after securing the tubers required for your own use to hurdle or fence the block off, dig a few and then turn the pigs in to do their own harvesting, supplying them with water, greenstuff, and charcoal, &c., while so engaged. Further information as to the growth of these crops may be obtained from seedmen's catalogues.

PUBLICATIONS RECEIVED.

"The Individuality of the Pig."

Robert Morrison. John Murray, London. 10*s. net.*

"The individuality of the Pig" is a new treatise on the humble hog. Mr. Morrison deals with the pig as an individual; he sets out his early history and development, and describes most interestingly his introduction into the commercial world of to-day. Chapters are devoted to breeding, feeding, and management, to the selection of boar and sow, the dentition of the pig, feeding and the cultivation of crops, preparation of animals for exhibition and sale, and marketing. The several breeds of pigs are described, while the closing chapters deal with diseases of the pig and with the subject of bacon curing. Altogether, Mr. Morrison's book is full of interest to farmers engaged in the industry, and to both student and master. To the Australian reader the book lacks one very important feature in that it is not well illustrated, and probably on that account would not be as widely read as are those publications illustrating both by photographs and drawings the various phases dealt with in the text. It is not an easy matter securing good clear live stock pictures, but the trend of modern life both in the city and on the farm is such that profusely illustrated publications sell and are read more freely than those that lack this attractive feature. The book published overseas at 7s. 6d. net retails at leading booksellers here at 10s. net, at which it represents good book value. If farmers generally were as conversant with the subject as the author of this publication all would be well. Our copy is from Barker's, Brisbane.

"Soil Management."

Firman E. Bear, Professor of Soils, Ohio State University; Associate in Soils, Ohio Agricultural Experimental Station. Edited by F. G. Lipman, B.Sc., A.M., Ph.D. John Wiley and Sons, Inc., New York; Chapman and Hall, Ltd., London.

The purpose of this book is primarily that of acquainting the student with the application of those scientific facts and principles which are of use in planning constructive systems of soil management and in increasing the productive capacities of soils. It is attractively printed and well illustrated, and covers the requirements of crops, characteristics of soils, utilisation of soil resources, conserving and supplementing soil resources. It is designed for the use of advanced students in agricultural science and practice.

"Agricultural Marketing."

John Truman Horner, Prof. Ec., Michigan State College. Same publishers. 12s. 6d. net. Our copy from Chapman and Hall, Ltd., 11 Henrietta st., Covent Garden, London W.C. 2.

With recent changes in the world's markets there has come a great interest in that phase of economics known as marketing. Everyone is looking for information concerning various processes of getting goods from the producer to the consumer and this volume is a valuable contribution to our general knowledge. It is an attempt to shed more light upon our economic problems, and certainly helps us to a better understanding of marketing methods and the factors governing them. The author discusses marketing and its scope and place in economics, standardisation of production, preparation of goods for market, storage, transportation, risk as a market cost, selling, the financing of agricultural marketing, care in producing, handling, and preparing for market, demand, correlation of supply and demand, market information and market weaknesses and remedies.

"Weeds of New Zealand."

F. W. Hilgendorf, M.A., D.Sc., F.N.Z. Inst. Whitcome and Tombs, Ltd., Auckland (New Zealand) and Melbourne.

One very obvious way of increasing agricultural and pastoral production is the fullest possible utilisation of nature's gift—land. This means, among other things, the elimination of weed growths from field and run. This book epitomises the hard-earned experience of many expert farmers and gives an account of the war on weeds as carried out in our sister Dominion—an account not without practical value to the Australian farmer.

"The Principles of Dairying—Testing and Manufactures."

Henry F. Judkins, Head of Dairy Department, Massachusetts Agricultural College. John Wiley and Sons, Inc., New York; Chapman and Hall, Ltd., London. 12s. 6d. net. Our copy from Chapman and Hall.

Most books on dairying deal with general production practice, and relatively little discussion is offered as to what happens to the product. This is a concise volume written in simple language and covers practical information on factory processes and practice. A very useful handbook.

"Dairy Engineering."

John T. Bowen, B.Sc., Engineer, Bureau of Dairying, United States Department of Agriculture. Same publishers. 12s. 6d. net. Our copy from Chapman and Hall, London.

This practical handbook is intended primarily to aid those engaged in the dairying industry in the selection, installation, operation, care, and management of the necessary machinery. It is also a good text-book on dairying. Its subject-matter is presented clearly and systematically.

"Chemistry for Agricultural Students."

R. H. Adie, M.A., B.Sc., Sometime Lecturer in Chemistry, St. John's College, Cambridge, Lecturer in Physics and Chemistry, School of Agriculture, Cambridge. W. B. Clive, University Tutorial Press Ltd., High st., New Oxford st., London, W.C. 5s. 6d. net. Our copy from the publishers.

This book contains the results of many years' experience in the endeavour to show the student how even the most fundamental facts and inferences of Chemistry and Physics have at once a bearing on his practical work and observations. The more advanced work based on chemical and physical principles deduced from mathematical considerations has been left by the author to specialist study. The volume is a very useful contribution to current technical and scientific literature.

Plate 89.—A Good Stand of Honey Sorgho grown by Mr. W. Jackson. North Eton, Mackay.
In twelve weeks it showed a growth of ten feet and returned a forty-ton crop.

Plate 90.—Honey Sorgho Crop on Mr. W. Jackson's Farm, North Eton, Mackay.
Another view showing good growth.

TRACTOR SCHOOL AT GATTON.

The Fourth Tractor School for farmers will open at the Queensland High School and College at Gatton on 12th April, under the direction of the Principal, Professor J. K. Murray. Following is the programme of activities in the course of the currency of the school:—

Tuesday, 12th April—
Morning—
7 to 8.30—Taking up and Adjusting Bearings; Mr. May (Tractor Engineer).
8.35 to 9.35—Cultivation; The Principal.
9.40 to 10.40—Farm Bookkeeping; Mr. Gallwey (Secretary).
10.45 to 11.45—Plant Breeding; Mr. McMillan (Plant Breeder).
Afternoon—
12.45 to 5 p.m.—Practical Work on Tractors.

Wednesday, 13th April—
Morning—
7 to 8.30—Taking up and Adjusting Bearings; Mr. May (Tractor Engineer).
8.35 to 9.35—Four-cycle Operations; Mr. Barratt (Chief Engineer).
9.40 to 10.40—Timing of Valves; Mr. May (Tractor Engineer).
10.45 to 11.45—Cooling Systems; The Principal.
Afternoon—
12.45 to 5 p.m.—Practical Work on Tractors.

Thursday, 14th April—
Morning and Afternoon—
Practical Work on Tractors.

Friday, 15th April—
Morning—
7 to 8.30—Taking up and Adjusting Bearings; Mr. May (Tractor Engineer).
9—Combined Protestant Church Service; Mr. Lapthorne.
10.30 to 11.30—Fertilisers; The Principal.
Afternoon—
12.40 to 1.45—Carburettors; Mr. Barratt (Chief Engineer).
2 to 3—Green Manuring; The Principal.
3.15 to 4.15—Diesel and Semi-Diesel Engines; Mr. Nixon.

Saturday, 16th April—
Morning—
7 to 8.30—Taking up and Adjusting Bearings; Mr. May (Tractor Engineer).
8.35 to 9.35—Four-cycle Operations; Mr. Barratt (Chief Engineer).
9.40 to 10.40—Transmission and Steering of Track Laying Tractors; Mr. May (Tractor Engineer).
10.45 to 11.45—Clutches and Differentials; Mr. May (Tractor Engineer).
Afternoon—
12.45 to 5 p.m.—Clearing Land by Explosives.

Sunday, 17th April—
Morning—
7.15—R.C. Church Early Mass, Gatton.
8.45—Protestant Church Service; Mr. Lapthorne.
Afternoon—
Picnic Luncheon; Glenore Grove.

Monday, 18th April—
Morning—
7 to 8.30—Taking up and Adjusting Bearings; Mr. May (Tractor Engineer).
8.35 to 9.35—Tractor Costing; The Principal.
9.40 to 10.40—Care of Tractors; Mr. May (Tractor Engineer).
10.45 to 11.45—Lubrication of Tractors; Mr. Barratt (Chief Engineer).
Afternoon—
12.45 to 1.45—Gear Boxes and Drives; Mr. May (Tractor Engineer).
3.15 to 4.15—Magneto Construction; Mr. May (Tractor Engineer).

Tuesday, 19th April—
Morning and Afternoon—
Practical Work on Tractors.

Wednesday, 20th April—
Morning and Afternoon—
Practical Work on Tractors.

Thursday, 21st April—

Morning—
Practical Work on Tractors.

Afternoon—
Distribution of Pamphlets.

EVENING TIME TABLE.

7 to 7.30 p.m. each evening will be devoted to any query regarding tractors or general agriculture that may be asked.

Lectures will follow at 8 p.m. as follows:—

Tuesday, 12th April—Mr. R. Veitch, Chief Entomologist, Department of Agriculture and Stock.

Wednesday, 13th April—Mr. E. McNicol, Gippsland and Northern Co-operative Pty., Ltd.

Thursday, 14th April—Picture show.

Friday, 15th April—Rev. Mr. Turner.

Saturday, 16th April—Wireless concert.

Monday, 18th April—Mr. A. G. Crawford, Chief Lubricating Engineer, British Imperial Oil Co.

Tuesday, 19th April—Vacuum Oil Co., Lantern Lecture on Internal Combustion Engines.

Wednesday, 20th April—Ford Motor Co., cinematograph.

AERIAL TRANSPORT IN QUEENSLAND.

The Queensland and Northern Territory Aerial Service figures for February were:—Route passengers, single stages, 148; taxi passengers, 25; freights (lbs.), 483; miles flown for month, 9,627; total company mileage all without injuries to personnel or passengers, 449,008.

The most interesting flight carried out during the month was that undertaken by Captain Moody, who flew from Longreach to Brisbane in 8 hours flying time. Roused from his couch at midnight on Friday, Pilot Moody was asked by a caller on the 'phone, 270 miles distant, whether he would undertake to pick up a passenger in Charleville and land him in Brisbane on Saturday afternoon. At peep of day the "prima donna" of the Quantas fleet, "Iris," took off from the Longreach aerodrome and nosed her way through the dawn, arriving in Charleville at 8.30. Here the passenger was picked up. En route to Brisbane landings were made at Mitchell and Dalby, at each of which towns both machine and occupants re-fuelled. Brisbane was reached at 4.30 p.m., and a pioneering effort had been accomplished by the company. On his return journey Captain Moody proceeded at leisure, landing at Toowoomba (to familiarise himself with the ground there), Dalby, Mitchell, and Charleville.

As a natural sequence to the heavy rains with which the north-western portion of the State was blessed, taxi planes were called into requisition by those desirous of moving any distance from their domiciles. From Cloncurry centre three such trips were carried out during the drying-up process. Two passengers were conveyed from Cloncurry to Julia Creek—a distance of 90 miles—and three to Glen Isla, a place 30 miles out of Cloncurry. The third trip was one which called for the utmost expedition, as a child's life was in the balance. A medical man had received an urgent call to a sick child. Within two hours of receiving the message the doctor was attending his little patient some 80 miles out of Cloncurry. Yet another trip of somewhat similar nature was that conveying a parent from Longreach to Barcaldine (70 miles) to comfort his child who had met with a nasty accident.

It is becoming more and more apparent every day how the man in the country is learning to regard aerial travel as his most efficient and economical means of getting about.

Notwithstanding the cyclonic disturbance which swept over the northern portion of the State, the usual weekly service between Charleville and Camooweal was studiously maintained.

General Notes.

Bananas in the North.

A proclamation under the Diseases in Plants Acts has been issued, prohibiting the introduction of banana plants into that part of Queensland within a ten-mile radius of Rollingstone Railway Station.

Queensland Pastoral Supplies.

We have received a comprehensive illustrated catalogue from the Queensland Pastoral Supplies, Ltd., universal providers, of Brisbane. It is a very useful publication, and in it is listed and priced every possible requirement for the home, station, and farm. It also contains much practical information which increases its value as a handy reference work.

Castration of Pigs.

A comprehensive pamphlet, profusely illustrated, on this important subject has been prepared by the Instructor in Pig Raising, Mr. E. J. Shelton, and is now in the hands of the printer, and will be published shortly. No pig raiser should be without such a practical handbook. It will be issued to farmers free of charge, and early application, which should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane, is advised.

Cotton Board.

An Order in Council enabling the Cotton Board to give the necessary securities to the Commonwealth Bank, for the financing of the Cotton Board's operations during the coming season, has been approved.

The following have been appointed Members of the Cotton Board, as from the 19th February, 1927, to the 18th February, 1929:—Messrs. D. Jones, Brisbane; H. R. Brake, Don River; J. Bryant, Chowey; D. C. Pryce, Toogoolawah; F. A. Kajewski, Ma Ma Creek; and L. R. Macgregor (Director of Marketing, Brisbane).

Cane Prices Boards Appointed.

As no nominations were received for representatives on the undermentioned Local Sugar Cane Prices Boards, the following representatives have been appointed:—

Fairymead Local Board.—Canegrowers' Representatives: F. J. Wheeler and E. M. Bauer.

Mount Bauple Local Board.—Canegrowers' Representatives: P. B. Scougall and A. W. Messer.

North Eton Local Board.—Canegrowers' Representatives: Geo. Johnson and H. C. Ross. Millowners' Representatives: E. Hannan and S. H. Scougall.

Obituary.

We have to announce with sincere regret the death on the 3rd March of Frederick William Becker, a member of the Fruit Branch of the Department of Agriculture and Stock.

The late Mr. Becker, who was an Inspector under the Diseases in Plants Act, entered the Public Service on 7th December, 1922, and was appointed Inspector on 7th June, 1923, and was a promising officer. He served overseas with the Australian Imperial Force in the Great War.

The funeral took place at Toowong Cemetery on the following day, in the presence of sorrowing relatives, and private and Public Service friends, and former comrades of the A.I.F.

Reduction of Freight on Silo Moulds.

It has been a Departmental practice for some years past to provide plans, specifications, and advice without charge to farmers who desire to construct silos for fodder conservation; and, in the case of reinforced concrete structures, to loan, also without fee, moulds for silos of 14 feet, 15 feet, and 17 feet diameter, to intending builders. Through the courtesy of the Railway Commissioner the moulds have now been scheduled in a new freight class, which means that the carriage on them to country centres has been very considerably reduced.

Accountancy Methods of Fruit Agents Standardised.

Regulations have been approved under the Fruit Marketing Organisation Acts standardising the accountancy methods of agents dealing in fruit. These Regulations take effect on and after the 1st March, 1927, and provide for the keeping, by fruit agents, of growers' receipt books, railway advice notes, accounts and records, &c. Agents will be required to permit any officer of the Committee of Direction of Fruit Marketing, duly authorised by the manager of the Committee, to inspect such books, accounts, &c., as may be necessary to ascertain whether the Regulations are being complied with. A penalty not exceeding £50 is provided for any breach of the Regulations.

What Music Means.

Few would care to dispute the fact that music plays an important part in our lives, and has a vital effect on our happiness. It would indeed be a much happier world if there were more music in it. Not without reason have man's ideas about Heaven been associated vividly with visions of music and singing. Writers, poets and artists tell us in prose, poetry and pictures about "the Harps of the Angels," "the Music of the Spheres," "the Harmony of the Heavens," and other similar ideas. This is because they have recognised the vital force, inspiration, and beauty of music, and associate it closely with the ideal of perfect happiness. Paling's announce that their Player Piano is a revelation of true musical beauty, and is the finest medium for musical education and entertainment. They may be obtained on easy terms, particulars of which may be had on application to their Brisbane warehouse.

Sugar Industry Finance.

Consequent on an arrangement which the Sugar Board has made with the Colonial Sugar Refining Company, it is expected that a sum of about £1,000,000 will be made available to the Board, without payment for interest, at a date about a month earlier than last year, and thus permit the Board, in the interests of the producers, to anticipate the final returns and payments of the 1926 season.

The Acting Treasurer (Mr. J. Mullan) recently made available to the Press the following statement by the Chairman of the Sugar Board (Mr. W. J. Short) on this subject:—

"The Board has been negotiating with the Colonial Sugar Refining Company with a view to finalising the transactions of the 1926 season before the due date, which, in the ordinary course, would be July next.

"Due to the cyclonic disturbance and floods in the North, and to the drought effects in the South, an earlier settlement is much to be desired. Whilst it is a little early yet to make the determination and declaration devolving upon the Sugar Board under the proclamation acquiring the sugar, sufficient data are available to enable it to be authoritatively stated that the net oversea price will approach £15 per ton.

"The result of the Board's operations will enable a sum of £26 15s. per ton to be paid for home consumption, 94 per cent. net titre sugar, so that an average price of £24 7s. 6d., approximately, will be the return for the 1926 season.

"Recognising the desirableness of anticipating final returns and payments in view of the necessities of the industry, the Colonial Sugar Refining Company was good enough to fall in with the Board's representations, and whilst a large sum, approximating a million sterling, is required, the company has agreed to make the sum available, without payment for interest, as early as it can be arranged after the issue of the Board's declaration.

"This payment, it is anticipated, will be about a month earlier than last year, when payment was made in June. However, this notification of an additional payment, it is expected, will enable producers to make satisfactory arrangements with the trading banks for necessary accommodation."

A Banana Plant Prohibition.

A Proclamation has been issued prohibiting the introduction of banana plants from any part of Queensland on to Bribie Island.

Entomological Society of Queensland.

The report of the Council of the Entomological Society of Queensland, read at its annual meeting at the Queensland University on 16th March, showed a steadily increasing membership. Officers elected for the ensuing year are:—President, Professor E. J. Goddard, B.A., D.Sc.; vice-presidents, Dr. J. Turner, M.D., and Mr. R. Veitch, B.Sc.; secretary, Mr. J. L. Froggatt, B.Sc.; treasurer, Mr. G. H. Hardy; councillors, Messrs. H. Hacker, A. P. Dodd, and L. Franzen.

Winter Feed—Good Crops on the Downs.

Winter feed is now being harvested in many parts of the Downs, and there are some wonderful crops of millet, Sudan, and other fodders. In places these are 10 feet high. At the Farm Home for Boys, Westbrook, Superintendent Jones announces that they have been busy making ensilage, and already have 200 tons. From Clifton district a remarkable yield of panicum is reported. A resident near the town sowed 12 lb. of seed in about half an acre of land, and has now harvested eighteen bags.

WHAT A FARMER THINKS OF THE JOURNAL.

A North Coast Farmer renewing his subscription writes:—

"Permit me to express how much I feel indebted to the Journal. Each month it comes without fail laden with information direct from the man of science and the expert, and its general get-up is excellent. The farmer is well and truly catered for in the Journal, and it is ours practically for the asking."

Staff Changes and Appointments.

Mr. R. M. Wallace, of the Stock Experiment Station, Townsville, and Mr. E. R. Hollanby, of Hermit Park, Townsville, have been appointed Inspectors of Slaughter-houses, Department of Agriculture and Stock.

Mr. O. St. J. Kent, B.Sc., Assistant to Analysts in the Agricultural Chemical Laboratory, has been appointed Analyst, Agricultural Chemical Laboratory.

The following transfers of Dairy Inspectors have been approved:—L. W. D. Verney, from Bundaberg to Beenleigh; E. W. Ladewig, from Beenleigh to Murgon; F. T. Heers, from Kingaroy to Bundaberg; and Mr. D. F. Keith, Herd Tester and Inspector of Dairies, Brisbane, will be attached to Cooroy.

The resignation of Mr. Jas P. Dowling, Inspector of Stock, Toowoomba, has been accepted as tendered.

Mr. George Williams, Experimentalist and Instructor in Fruit Culture, has been appointed Acting Director of Fruit Culture as from 1st April, 1927.

The appointment of Mr. L. V. Hodge as Manager of the Callide Cotton Research Farm, Biloela, has been confirmed as from the 9th August, 1926.

Mr. D. C. Pryce, of Toogoolawah, has been appointed Chairman of the Cotton Board to the 18th February, 1929.

The following have been appointed Rangers under the Animals and Birds Acts, and are attached to the Department of Agriculture and Stock with headquarters as under:—

	Headquarters.
Messrs. W. E. Black	Mackay
J. H. Dendle	Emerald
W. F. Hough	Roma
A. K. Williams	Rockhampton
W. D. Wilson	Brisbane

Close Season for Quail.

The period of close season for quail has been extended for one month as from the 31st March, 1927, to the 30th April, 1927.

Peanut Board.

An Order in Council has been approved, enabling the Peanut Board to give the necessary security required for the financial accommodation to be provided by the Commonwealth Bank.

Babinda Cane Prices Board.

The following members have been appointed to the Babinda Local Sugar Cane Prices Board:—Millowners' Representatives: Messrs. F. A. Lamont and W. J. Ryan. Canegrowers' Representatives: Messrs. S. H. Warner and D. C. James. Chairman: Mr. A. H. O'Kelly, Police Magistrate, Cairns.

Cheese Traders' Licenses.

Owing to the passing of "*The Primary Producers' Organisation and Marketing Act of* 1926," it was necessary to revise the Regulations providing for the licensing of persons trading in cheese. This has been done, but no material alterations have been made in the Regulations as passed under the Primary Products Pools Acts.

The Sydney "Bulletin" goes Farming.

The Sydney "Bulletin," known to country readers for a generation as the "Bushman's Bible," recognising the immense importance of Agriculture to the Commonwealth, has decided to extend its service to the man on the land. Its habit, as is well known, is to take the broader view of Australian life and problems, and its plan for making more articulate the man who matters most—the producer—is sure to win widespread commendation. In furtherance of this aim, it has increased its size to include an ably supplied farm and station section. The farmers of Queensland will, no doubt, welcome this improved medium of expression of much that is best in our national life and work.

Metropolitan Milk Supply.

The Acting Premier and Minister for Agriculture, Mr. W. Forgan Smith, has informed the Press that his notice has been drawn to the references made at a meeting of the City Council to the matter of the metropolitan milk supply.

"In connection with this matter," said Mr. Smith, "it will be remembered that a deputation from the City Council waited upon me as Minister for Agriculture in March of last year and, *inter alia*, requested that the control of the milk supply within the Greater Brisbane area should be handed over to the Greater Brisbane Council. I agreed to the necessary powers being vested in the City Council, but could not, as wished by the Council, give it authority to exercise powers over dairies outside its area, because to do so would interfere with the rights of the local authorities in those places.

"I appreciate clearly the importance of citizens being supplied with adequate supplies of pure milk, and serious efforts have been exercised by officers of my Department to ensure that the milk consumers are being supplied with the wholesome product. It is the function of the health authorities to submit samples of the milk to such tests and examinations for purity as are considered necessary, and the reports from the Commissioner of Public Health indicate that close attention is being given to this matter, and that considerable improvement in the quality of the milk has been effected. The matter of tuberculosis of the bovine type being conveyed to humans through the medium of the milk supply has been referred to from time to time, but from the evidence available it is difficult to determine whether the milk supplied in Brisbane is a potential medium of conveyance of this particular disease. However, the cows from which milk is drawn are subject to careful inspection, and the whole matter of whether or not the tuberculin test should be applied to animals from which milk is drawn for human consumption is under consideration. In conclusion, I may say that since the deputation in March, 1926, to which I have already referred, no definite intimation has been received by me from the Greater Brisbane Council that they wish to assume the responsibility and expense of the direct control of the milk produced and distributed within the metropolitan area. Consequently, I am somewhat surprised to notice that an alderman is reported as having stated that it was not true that the Government was prepared to give up its powers in connection with milk supervision in the Brisbane area."

Organisation and Marketing—New Regulation.

A further Regulation under the Primary Producers' Organisation and Marketing Act has been approved providing that all containers of seed cotton shall be branded by the grower prior to despatch to the Cotton Board, with initials and surname in full of the grower, the name of the station from which the cotton is consigned, and the registered number of the grower as supplied to him by the Queensland Cotton Board, in letters not less than one and a-half inches in height. Growers must apply to the Queensland Cotton Board for their registered numbers.

The Marketing of Immature Oranges.

The Acting Premier and Minister for Agriculture and Stock, Mr. W. Forgan Smith, informed the Press recently that Inspectors of his Department had brought under his notice the matter of immature oranges that were being sent on to the market. Samples of these oranges had been analysed and had been found to contain up to 2½ per cent. of citric acid. As the maximum amount of citric acid allowable in an orange under the Fruit Cases Act is only 1½ per cent., it will be seen that many of the oranges now coming forward are really palpably immature. The persons who are sending these oranges forward are rendering themselves liable to prosecution, and the Minister wishes it to be known that if the law in this respect is further transgressed in the future legal proceedings will be instituted.

Our Right to Responsibility.

Thus Principal L. P. Jacks in the New Zealand "Dominion":—"The ideal social system is sometimes represented to us as though it would automatically relieve the citizen of the burden of his responsibilities. The citizen has only, it is suggested, to put his vote in the ballot-box as he would put a penny in the slot, and the ideal social system will do the rest. We sometimes delude ourselves by thinking that that is just the sort of system that will suit us. In reality there is none of us who could endure it for a day, because it would deprive us of our right to responsibility, which is the last thing a free man could ever surrender. Surely it is nearer the mark to say that the good social system is one which will increase the responsibility reposed in the citizens and not the one which deprives them of responsibility by treating them as if they are all regimented units in a mass."

Arrowroot Board.

The following nominations have been received at the Department of Agriculture and Stock for the election of five growers' representatives on the Arrowroot Board:—

Alexander Clark, Pimpama.
Hans Grantz, junr., Norwell.
Alexander McGregor Henderson, Redland Bay.
John William Latimer, Norwell.
William Frank Oxenford, Oxenford.
Benjamin George Peachey, Ormeau.
Wilhelm August Schipplock, Norwell.
Robert Stewart, Ormeau.
Johann Friedrich Wilhelm Sultmann, Pimpama Island.

The election will take place on the 14th April next, and the successful candidates thereat will hold office for a term of one year.

Royal Society of Queensland—Council's Report.

Sixteen original papers were read and discussed before the society and published in the course of the year. One meeting of a popular character was held. On this occasion Mr. E. Ballard, B.A., delivered a lecture on "A Journey up the Markham Valley, New Guinea."

The council wishes to acknowledge generous subsidies amounting to £205 from the Queensland Government towards the cost of printing the Proceedings of the Society. Appreciative acknowledgment is also expressed to the University of Queensland for housing the library and providing accommodation for meetings.

The membership roll consists of seven corresponding members, six life members, 155 ordinary members, and six associates. During the year eight new members and one associate were elected. One corresponding member and two life members died.

The deaths of the Honourable A. J. Thynne (a trustee), Mr. Chas. Hedley (corresponding member), Mr. R. H. Roe (life member), and Mr. W. Weedon (life member) are reported with regret.

Orchard Notes for May.

THE COASTAL DISTRICTS.

In these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become specked or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from 2¼ to 2½ in. in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of specky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. Do not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. in diameter in a single layer.

Slowly acting manures—such as meatworks manure—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Clean up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place as, if delayed till the pruning has been finished, the land is apt to dry out in a droughty season.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—*not vines*, as the later vines are pruned in the season the better in the Granite Belt District, as late pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manure—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

Farm and Garden Notes for May.

FIELD.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late maturing varieties should be in the ground by the middle of the month at the latest.

Cleveland, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. All consignments to the ginnery should be legibly branded with the owner's initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

Kitchen Garden.—Onions which have been planted in seed beds may now be transplanted. The ground should long since have been thoroughly cleaned, pulverised, and should be rolled previous to transplanting. Onions may still be sown in the open on clean and well-prepared ground. In favourable weather plant out cabbages, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these as well as of peas, broad beans, kohl-rabi, radishes, spinach, turnips, parsnips, and carrots, and, where sufficiently large, thinned out. Dig and prepare beds for asparagus, using plenty of well-rotted farmyard manure.

Flower Garden.—Planting and transplanting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, pentstemons, heliotrope, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia bulbs should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate, but hyacinths may be tried, although success is doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

DEPARTMENT OF AGRICULTURE AND STOCK, QUEENSLAND.

PRICE LIST OF STUD BERKSHIRE PIGS FOR SALE

at

STATE FARM, WARREN, via ROCKHAMPTON, CENTRAL QUEENSLAND.

The undermentioned animals are available at Prices Quoted for the Current Month only:—

LIST No. 1 FOR MONTH OF APRIL, 1927.

Farm No.	Description.	Sire.	Dam.	Date Farrowed.	Price.			Remarks.
					£	s.	d.	
1269	Berk Sow	Warren Monarch	W. Sadie	2-11-26	4	4	0	
1274	Berk Sow	Warren Monarch	W. Bonny	14-11-26	4	4	0	
1275	Berk Sow	Warren Monarch	W. Bonny	14-11-26	4	4	0	
1276	Berk Sow	Warren Monarch	W. Bonny	14-11-26	4	4	0	
1277	Berk Sow	Warren Monarch	W. Bonny	14-11-26	4	4	0	
1281	Berk Boar	Warren Baritone	W. Pansy	17-11-26	4	4	0	
1282	Berk Boar	Warren Baritone	W. Pansy	17-11-26	4	4	0	
1213	Berk Boar	Warren Premier	W. Bliss	26-8-26	5	5	0	
1205	Berk Sow	Warren Premier	W. Perfection	27-8-26	5	5	0	
1206	Berk Sow	Warren Premier	W. Perfection	27-8-26	5	5	0	
1194	Berk Sow	Warren Monarch	W. Elsie	10-8-26	6	6	0	
1163	Berk Sow	Wilmot Ron	W. Pansy	6-5-26	7	7	0	
1120	Berk Boar	Warren Baritone	W. Buxom	20-3-26	7	7	0	

The above quotations are for pigs crated on rails Warren Station.

When placing orders full forwarding instructions should be furnished, together with Remittance, with Exchange added.

Further particulars may be obtained upon application to the Manager, State Farm, Warren, *via* Rockhampton.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK:

1927.	MARCH.		APRIL.		MOONRISE. March.	April.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
				a.m.		a.m.
1	5.46	6.24	6.3	5.50	2.25	4.33
2	5.47	6.23	6.4	5.49	3.32	5.41
3	5.48	6.22	6.4	5.48	4.41	6.48
4	5.48	6.21	6.5	5.47	5.49	7.55
5	5.49	6.20	6.6	5.45	6·57	9.1
6	5.49	6.19	6.6	5.44	8.4	10.7
7	5.50	6.17	6.7	5.43	9.10	11.11
						p.m.
8	5.50	6.16	6.7	5.42	10.16	12.8
9	5.51	6.15	6.8	5.41	11.18	1 3
					p.m.	
10	5.51	6.14	6.8	5.40	12.21	1.52
11	5.52	6.13	6.9	5.39	1.21	2.36
12	5.52	6.12	6.9	5.38	2.16	3.14
13	5.53	6.11	6.10	5.37	3.7	3.48
14	5.54	6.10	6.10	5.36	3.54	4.21
15	5.55	6.9	6.11	5.35	4.34	4.50
16	5.55	6.7	6.11	5.34	5.12	5.21
17	5.56	6.6	6.12	5.33	5.46	5.51
18	5.57	6.5	6.12	5.32	6.17	6.23
19	5.57	6.4	6.13	5.31	6.54	6.58
20	5.58	6.3	6.13	5.30	7.18	7.37
21	5.58	6.2	6.14	5.29	7.50	8.19
22	5.59	6.0	6.14	5.28	8.23	9.9
23	5.59	5.59	6.15	5.27	9.1	10.2
24	6.0	5.58	6.15	5.26	9.38	11.0
25	6.0	5.57	6.16	5.25	10.22	...
						a.m.
26	6.1	5.56	6.16	5.24	11.14	12.3
27	6.1	5 55	6.17	5.23	...	1.8
					a.m.	
28	6.2	5.53	6.17	5·22	12.10	2.12
29	6.2	5.52	6.18	5.22	1.10	3.18
30	6.3	5.51	6.18	5.21	2.17	4 24
31	6.3	5.50	...	...	3.25	...

Phases o the Moon, Occultations, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania.

2	April	● New Moon	2 24 p.m.
9	,,	☾ First Quarter	10 20 p.m.
17	,,	○ Full Moon	1 0 p.m.
25	,,	☽ Last Quarter	8 20 a.m.

Venus will be in conjunction with the Moon on the 4th, affording an interesting spectacle low down in the west half-an-hour after sunset.

Mercury will be at its greatest elongation west on the 10th of April.

The occultation of Saturn by the Moon, which will occur before 10 p.m. on the 20th, when both are well situated somewhat north of east, should afford an especially fine spectacle to all observers with or without b'noculars.

Mercury will rise one hour fifty-six minutes before the Sun on 1st April, and two hours two minutes before on the 15th.

Venus will set one hour thirty-two minutes after the Sun on the 1st, and set one hour forty-six minutes after it on the 15th.

Mars will set three hours fifty-four minutes after the Sun on 1st April, and three hours fifty-one minutes after it on the 15th.

Jupiter will rise one hour forty-seven minutes before the Sun on the 1st April, and two hours thirty-five minutes before it on the 15th.

Saturn will rise three hours three minutes after sunset on 1st April, and two hours twenty-four minutes after it on the 15th.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]